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NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.
Albanian	Alb.
Arabic	Ara.
Armenian	Arm.
Azerbaijani	Aze.
Belorussian	Bel.
Bengali	Ben.
Bulgarian	Bul.
Burmese	Bur.
Chinese	Chi.
Croatian	Cro.
Czechoslovakian	Cze.
Danish	Dan.
Dutch	Dut.
English	Eng.
Esperanto	Esp.
Estonian	Est.
Finnish	Fin.
Flemish	Fle.
French	Fre.
Gaelic	Gae.
Georgian	Geo.
German	Ger.
Greek	Gre.
Hausa	Hau.
Hebrew	Heb.
Hindi	Hin.
Hungarian	Hun.
Icelandic	Ice.
Indonesian	Ind.
Interlingua	Int.
Italian	Ita.
Japanese	Jpn.
Kirghiz	Kir.
Korean	Kor.
Latin	Lat.
Latvian	Lav.
Lithuanian	Lit.
Marathi	Mar.
Masai	Mas.
Multilingual	Mlt.
Norwegian	Nor.
Persian	Per.
Polish	Pol.
Portuguese	Por.
Pushto	Pus.
Rumanian	Rum.
Russian	Rus.
Serbian	Ser.
Slovak	Slo.
Slovene	Slv.
Spanish	Spa.
Swahili	Swa.
Swedish	Swe.
Tagalog	Tag.
Tamil	Tam.
Telugu	Tel.
Thai	Tha.
Turkish	Tur.
Ukranian	Ukr.
Urdu	Urd.
Vietnamese	Vie.
Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED_{50}	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

5365 THE MORPHOLOGY OF THE PAPILLA OF VATER. (Ger.) Fodisch, H.-J. (No affiliation given). *Fortschr. Med.* 93(5):193-197; 1975.

The morphology of the papilla of Vater is reviewed. In many respects the papilla of Vater serves as the keystone of a functional system including the duodenum, bile ducts, liver, and pancreas. Aside from the variations in filling and emptying conditions, variations in form result only from the inclination of the opening plane, which may be vertical or inclined at various angles. Obstacles that may interfere with endoscopic recognition of the papilla are major positional anomalies and confusion with duodenal polyps or ancillary papillae, enlarged hoods covering the organ, large longitudinal mucous membrane folds, and openings of the ducts in or on the edge of large duodenal diverticuli. The mucous membrane of the papilla contains a system of duplicatures and niches, varying from longitudinal folds at the bottom, to a network structure in the center, and a band functioning as a valve at the upper end. The normal microscopic picture of the papilla has been the subject of controversy, but cross sections of the organ reveal a layered structure. The form and function of the gland are closely interrelated. The superficial and glandular epithelium is monolayered and cylindrical, and produces neutral and acidic mucopolysaccharide mixtures. The helical musculus complexus papillae serves secretion transport, and the valve system of the mucous membrane prevents reflux and duodenal influx. The nervous and neurohormonal regulation of papillar function remains unresolved. Two symptomatic findings are important for the endoscopist: uniform enlargement of the structure and structural deviations of the opening. The benign stenosis syndrome is generally due to chronic granulating inflammation. Florid papillitis was found in 84.5% of acute and chronic duodenal ulcers in the papillar area, in 93.6% of cases with choledocholithiasis, and in 65% of the cases of cholelithiasis and chronic cholecystitis. Smear, curettage, and biopsy examination methods may each be useful.

5366 THE STRUCTURE AND HISTOCHEMICAL FEATURES OF HUMAN VATER'S PAPILLA MUCOSA (BASED ON AIMED BIOPSIES). (Rus.) Aurin, L. I.; Vasiliev, Y. V.; Gorodinskaja, V. S.; Malkerova, N. N. (Res. Inst. Gastroenterology, Moscow, USSR). *Arkh. Anat. Gistol. Embriol.* 68(3):18-22; 1975.

The structural and histochemical characteristics of the mucous membrane of the papilla of Vater were studied using 5 μ-thick specimens from 52 aimed duodenal biopsies. Three different types of structural and histochemical variations were seen. The first variation, called the duodenal type, did not differ much from the surrounding mucous membrane of the duodenum; it was pink in color, with equally distributed intestinal villi (320-350 μ). A large amount of RNA was detected in the cytoplasm of the cells located in the villi, which gradually decreased toward the top. The cells at the base of the villi contained small granules, which reacted positively with Schiff's reagent, but did not show any coloration with Best's carmine or toluidine blue, revealing the presence of neutral mucopolysaccharide. Histochemically, the duodenal type of membrane variation should be considered to be an absorbent type. The second type of variation was found during 20 autopsies and was called the mucoid type. The membrane was lighter in color and shinier in appearance than the mucous membrane of the duodenum; the villi were short, thick, and irregular (200-250 μ). Cells from this variation should be considered as the secretory type. Epithelial cells resembled the cells of the epithelium of the stomach, bile ducts, and the gallbladder, all of which were colored by Best's carmine. The third type of variation, the intermediate type, appeared to be a not fully differentiated duodenal mucoid form, but appeared capable of becoming either one. In some cases of this variation, the morphologically and histochemically peculiar round form cells were seen, which may be a variation of goblet cells.

5367 DIRECT METHOD FOR ESTIMATING THE TOTAL GASTRIN CELL NUMBER IN THE STOMACH OF RATS. (Eng.) Willems, G.; Nyst, M.; Delince, Ph.; De Graef, J. (St-Peter Hosp., 322 Hoogstraat, B. 1000 Brussels, Belgium). *Gastroenterology* 71(3):533-536; 1976.

A method in which the total number of gastrin cells in the stomachs of small rodents can be directly estimated without measuring the retraction or the total surface is described. By staining the cells with the peroxidase-antibody technique and counterstaining the nucleus, it is possible to correct the nuclear overestimation. In sections of male Wistar rat stomachs, the mean section thickness was 7.2 μm. The mean nuclear diameters of gastrin cells in the cross sections from the strips ranged between 6.4 and 7.0 μm in the six rat stomachs used. The error due to nuclear overestimation was about 92%. The corrected total number of gastrin cells per strip and per stomach ranged between 415,375 and 590,373. Direct counting of the total number of gastrin cells in sections from the entire stomach avoids errors due to tissue retraction and imprecise delineation of the antro-fundic limit. The homogeneity of the values obtained with this technique indicates that it may be used to investigate experimental variations in the total gastrin cell population in the stomachs of small animals.

5368 A LIGHT AND ELECTRON MICROSCOPIC STUDY OF THE CHANGES IN THE DUODENAL MUCOSA INDUCED BY SUSTAINED PENTAGASTRIN STIMULATION OF GASTRIC ACID SECRETION IN YOUNG RATS. (Eng.) Patrick, W. J. A.; Denham, D.; Hawkins, W.; Forrest, A. P. M. (Dept. Clinical Surgery, Univ. Edinburgh, Edinburgh, Scotland). *Br. J. Exp. Pathol.* 56(6):510-522; 1975.

Changes in the duodenal mucosa in young Sprague-Dawley rats, induced by sustained pentagastrin stimulation of gastric acid secretion, were investigated by light and electron microscopy over an 8-week period. Rats received pentagastrin (2 mg/12 hr, s.c.) in a medium of beeswax and mineral oil for up to 8 weeks. Samples of mucosa from the proximal, middle, and distal duodenum were taken weekly. Light microscopy showed that 17 of 24 test animals and 6 of 24 control rats (beeswax and mineral oil only) had a decisive alteration in the villous structure (degenerative epithelial necrosis and edematous bullae). These figures are statistically significant ($0.010>p>0.001$). Under electron microscopy, the villous epithelial cells had separated from the basal lamina and the interval between the cells and the basal lamina was occupied by fine, fibrillary proteinaceous fluid. The epithelial cells were generally enlarged, with the epithelial intercellular space occluded, except for a few limited areas. The plasma membrane of the microvilli showed considerable irregularity and vesiculation. The cytoplasm of the cells was completely disorganized, with fragments of endoplasmic reticulum and Golgi complex, disrupted vacuolated mitochondria, and a variety of pleomorphic membranous vesicles dispersed in a haphazard manner. The goblet cells and the intraepithelial lymphocytes were similarly affected. The basal lamina was at least 10 times thicker than normal; fragments of epithelial cell cytoplasm were attached to its surface. Mucous change was not induced in undifferentiated duodenal epithelial cells. It is concluded that the marked histologic changes are the result of damage to the duodenal epithelium by gastric acid.

5369 INTESTINAL RECOVERY IN THE PIG IRRADIATED AT HIGH DOSES. ENZYMOLOGICAL, HISTOLOGICAL, AND FUNCTIONAL DATA. (Fre.) Daburon, F.; Chomette, G.; Remy, J.; Villiers, P.-A.; Gregond, J.-C.; Tricaud, Y.; Sevignac, M.; Haag, J. (Laboratoire de Radiobiologie Appliquee C.N.R.Z., F 78350 Jouy-en-Josas, France). *Biol. Gastroenterol.* 8(4): 321-338; 1975.

Histological, enzymological, and functional aspects of the intestine were studied in Pitman Moore pigs exposed on the posterior half of their bodies to irradiation with 800-1,500 rads from a ^{60}Co source. When doses were under 1,250 rads, the intestine showed good recovery, histologically and enzymatically, within a month; however, lipid and calcium malabsorption persisted for more than 3 months. Correlation of enzymatic recovery with systematic histological studies of biopsy specimens revealed enzymatic recovery commencing on days 9-10 despite the extent of the histological lesions. Weight of animals exposed to 800 rads remained normal; a weight loss, which was regained in a month, was observed in animals exposed to 950 rads. After exposure to 1,250 rads or more, incipient recovery of the intestine led to permanently atrophic and nonfunctional mucosa and impairment of nutrition.

5370 SUBMICROSCOPICAL STRUCTURE OF GASTRIC MUCOUS MEMBRANE UNDER NORMAL AND PATHOLOGICAL CONDITIONS. I. ELECTRONMICROSCOPIC STUDY OF MUCOSAL SURFACE CELLS AND OF GLANDULAR ISTHMUS CELLS OF NORMAL HUMAN GASTRIC MUCOSA. (Cze.) Belak, M.; Lakata, E.; Bilcik, P.; Kovalkovic, L. (Vysoka skola veterinarska, Centralne laboratorium elektronovej mikroskopie, Kosice, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(5):330-334; 1975.

5371 SUBMICROSCOPIC STRUCTURE OF THE GASTRIC MUCOSA UNDER NORMAL AND PATHOLOGICAL CONDITIONS. II. ELECTRON MICROSCOPIC EXAMINATION OF THE MAIN ZYMOGENIC CELLS IN THE GASTRIC FUNDUS OF HUMANS. (Slo.) Lakata, E.; Belak, M.; Bilcik, P.; Kovalkovic, I. (II. interna klinika Lek., fakulty Univerzity P. J. Safarika, Kosice, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(7):460-463; 1975.

5372 SUBMICROSCOPIC STRUCTURE OF THE GASTRIC MUCOSA UNDER NORMAL AND PATHOLOGICAL CONDITIONS. III. ELECTRON MICROSCOPIC INVESTIGATION OF PARIETAL CELLS IN THE GASTRIC FUNDUS OF HUMANS. (Slo.) Belak, M.; Lakata, E.; Bilcik, P.; Kovalkovic, I. (Centralne laboratorium elektronovej mikroskopie Vysokej Skoly veterinarskej, Kosice, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(8):535-540; 1975.

5373 ULTRASTRUCTURAL CHANGES IN SUBCELLULAR MEMBRANES OF HEPATOCYTES AT EARLY PERIODS OF FASTING. (Rus.) Pokrovsky, A. A.; Tashev, T. A.; Krystev, L. P.; Tutelyan, V. A.; Kravchenko, L. V. (Inst. Nutrition, USSR Acad. Medical Sciences, Moscow, USSR). *Vopr. Pitan.* (2):26-31; 1976.

5374 SCANNING ELECTRON MICROSCOPIC STUDY OF THE GASTRIC MUCOSAL SURFACE-I. (Jpn.) Yamagiwa, H. (Pathological Div. Mie Univ. Hosp., Tsu, Japan). *Jpn. J. Clin. Pathol.* 23(8):657-659; 1975.

5375 AN ELECTRON MICROSCOPIC STUDY OF THE LYMPHATIC CAPILLARIES IN THE INTERLOBULAR CONNECTIVE TISSUE OF THE RABBIT LIVER. (Jpn.) Fujikawa, K.; Magari, S. (Osaka Medical Coll., Osaka, Japan). *Acta Anat. Nippon* 50(3):129-137; 1975.

5376 INFLUENCE OF AUTOLYSIS ON THE QUANTITATIVE CYTOARCHITECTURE OF RAT HEPATOCYTES. (AN ULTRASTRUCTURAL STUDY). (Ger,) Riede, U. N.; Lobinger, A.; Grunholz, D.; Steimer, R.; Sandritter, W. (Pathologisches Institut der Universitat, Albertstr. 19, D-7800 Freiburg i. Br., W. Germany). *Beitr. Pathol.* 157(4):391-411; 1976.

5377 THE STRUCTURE OF THE HUMAN DUODENAL MUCOSA IN OLD AGE. (Rus.) Valenkevich, L. N.; Zhukova, N. M. (Leningrad Medical Inst. Pediatrics, Leningrad, USSR). *Arkh. Patol.* 38(3):58-61; 1976.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

5378 ON THE DENSITY OF THE LYMPHATIC BED OF THE SEROUS MEMBRANE OF THE SMALL INTESTINE. (Rus.) Gusejnov, T. S. (Dagestan Medical Inst., Dagestan, USSR). *Arkh. Anat. Gistol. Embriol.* 68(7):29-32; 1975.

5379 THE FINER DISTRIBUTION OF THE LYMPHATIC VESSELS IN THE ESOPHAGEAL WALL. (Jpn.) Kawamura, Y. (Kasumigaura Hosp., Kasumigaura, Japan). *J. Tokyo Med. Coll.* 33(1):103-109; 1975.

See also, 5365, 5480, 5490, 5505, 5705, 5742, 5897.

ABSORPTION - EXCRETION - TRANSPORT

5380 INTESTINAL ABSORPTION OF VITAMIN D_3, LINOLEIC ACID, AND CHOLESTEROL FROM MICELLAR SOLUTIONS: STUDY IN NORMAL HUMANS BY THE "IN SITU" PERFUSION TECHNIQUE. (Fre.) Lenormand, Y.; Rautureau, M.; Mary, J.-Y.; Rambaud, J.-C. (Hopital Saint-Lazare, 107, rue du Faubourg-Saint-Denis, F 75010 Paris Cedex 10). *Biol. Gastroenterol.* 8(3):207-221; 1975.

The intestinal absorption of vitamin D_3, linoleic acid, and cholesterol from micellar solutions was studied in normal humans (13 men and 4 women, aged 23-67 yr) by the segmental perfusion technique. Mixed micellar solutions contained (per liter of Krebs solution) 10 mM of bile salt conjugated with taurodeoxycholate (TDC) or glycocholate of sodium (GC), 2.4 mM of monooleate, 4.8 mM linoleic acid, 20 µg of vitamin D, 4 µCi tritiated vitamin D_3, 4 µCi of linoleic acid labeled with ^{14}C, 10 g of polyethylene-glycol and 0-4.14 mM/l of cholesterol. Simple micellar solutions did not contain the lipids, linoleic acid or monooleate. The solutions were perfused at a rate of 8 ml/min into a 25-cm segment of the ileum or jejunum. Results were tabulated according to three parameters: (1) level of intestine perfused (jejunal or ileal), (2) the type of bile salt used for micellar solubilization, and (3) the presence of monooleate, linoleic acid and/or of cholesterol in solution. Absorption of vitamin D_3 was significantly ($p<0.05$) lower in the ileum than in the jejunum, although three subjects did not demonstrate this difference. Jejunal absorption of vitamin D was significantly higher with GC than with TDC. Similar results were observed with linoleic acid and cholesterol. Physiological concentrations of cholesterol did not significantly modify jejunal or ileal absorption rates of vitamin D_3 nor did presence of lipids modify ileal absorption of the vitamin.

5381 STIMULATION IN VITRO BY 1,25-DIHYDROXY-VITAMIN D_3 OF INTESTINAL CELL CALCIUM UPTAKE AND CALCIUM-BINDING PROTEIN. (Eng.) Freund, T.; Bronner, F. (Univ. Connecticut Health Center, Farmington, CT 06032). *Science* 190(4221):1300-1302; 1976.

Duodenal tissues from vitamin D-deficient Sprague-Dawley rats were treated with 1,25-dihydroxy-vitamin D_3 [$1,25\text{-}(OH)_2\text{-}D_3$] to determine whether the cell uptake process reflects events *in vivo* and is a metabolic event. The rats were considered to be vitamin D-deficient when they became hypocalcemic (<7 mg Ca/100 ml plasma) or when their intestines contained undetectable amounts of the vitamin D-dependent calcium-binding proteins (CaBP) after being fed a diet containing no vitamin D_2. Rats fed a diet containing 2,200 IU vitamin D_2 per kg served as controls. The calcium uptake of cells isolated from vitamin D-deficient hypocalcemic cells increased with time, and the addition of 4.7×10^{-8} M $1,25\text{-}(OH)_2\text{-}D_3$ markedly and significantly stimulated calcium uptake. This was not the case when a similar amount of 25-hydroxy-vitamin D_3 (25-OH-D_3) was added to the isolation medium. In seven experiments, the addition of $1,25\text{-}(OH)_2\text{-}D_3$ led to an average 2.6-fold increase in calcium uptake in duodenal cells isolated from vitamin D-deficient animals. Cells from vitamin D-repleted animals took up 3.5 times more calcium on the average than did cells from vitamin D-deficient animals. In cells from vitamin D-deficient hypocalcemic animals that had received 15 U (0.39 µg) of 25-OH-D_3 i.p. 30 hr previously, a 3.1-fold increase in calcium uptake was seen over cells from deficient controls. CaBP was found ($V_e/V_o=2$, where V_e is the elution volume, 68 ml, and V_o is the void volume, 34 ml) in the material from the vitamin D-repleted animals, absent in the cells from deficient animals, and present in the $1,25\text{-}(OH)_2\text{-}D_3$-treated vitamin-D deficient animals. The amount of CaBP treated *in vitro* was two-thirds that found in repleted cells, comparable to the increase in calcium uptake. Inhibitors of oxidative phosphorylation (dinitrophenol, methylene blue, potassium cyanide, and dichlorophenol indophenol, all at 5mM) depressed calcium uptake by about half (58, 53, 51, and 49%, resp.), but compounds that bind -SH groups (*p*-chloromercuribenzoate and iodoacetamide, 5mM) had no effect, the inhibition being 6% and 3%, resp. These experiments demonstrate that the cell uptake process is a metabolic event in which $1,25\text{-}(OH)_2\text{-}D_3$ plays a regulatory role.

5382 EFFECT OF PHENFORMIN ON INTESTINAL ABSORPTION OF CALCIUM IN HUMANS.

(Pol.) Jozwicka, E.; Czyzyk, A.; Szymendera, J.; Szczepanik, Z.; Radwan, M. (III Klinika Chorob Wewnetrznych Akademii Medycznej w Warszawie, ul Lindleya 4, 02-005 Warsaw, Poland). *Pol. Arch. Med. Wewn.* 53(6): 535-540; 1975.

The hypothesis that decreased insulin secretion during phenformin hydrochloride treatment is caused by the decreased intestinal calcium absorption was tested in 12 healthy subjects. Feces were collected for three consecutive 4-day periods in six of the subjects, and the calcium content was measured; the first 4-day period was used as a control. During the second period, each member of the group was given three tablets per day, each containing 50 mg of phenformin. During the third period, no drug was given. The remaining six subjects received simultaneously, 10 μCi of Ca^{47}, p.o., and 10 μCi of Ca^{43}, i.v., after which intestinal calcium absorption was determined by deconvolution. This procedure was undertaken both prior to phenformin hydrochloride administration and 6 weeks later, after each subject had received 150 mg of phenformin daily, p.o., for 4 days before the procedure. In both groups, a significant increase in the intestinal absorption of calcium during phenformin administration was observed. Since this drug inhibits the duodenal transport of calcium, the increased absorption was thought to be an effect of increased passive absorption in the more distal parts of the small intestine, facilitated by a slowing down of the motile activity in the small intestine. The results indicate that reduced secretion of insulin caused by phenformin cannot be explained by the inhibition of intestinal calcium absorption.

5383 EFFECT OF SECRETIN ON INTESTINAL MONOSACCHARIDE ABSORPTION AND NET WATER MOVEMENT IN THE RAT.

(Eng.) Bohmer, R.; Rommel, K. (Abteilung fur Klinische Chemie, Universitat Ulm, Steinhovelstrasse 9, D-7900 Ulm, W. Germany). *Digestion* 13(6):325-333; 1975.

The influence of repeated i.v. injections of secretin on the intestinal net water movement and glucose absorption in the rat small intestine *in vivo*, and on the galactose and 3-0-methylglucose uptake *in vitro* was studied in female specific pathogen-free Wistar rats. Catheters were tied into the lumen of the jejunum, 20 and 45 cm distal to the pylorus. This segment was perfused with a solution of glucose (30 mM), Na (147 mM), K (4.0 mM), Ca (2.25 mM), Cl (155 mM), and phenol red (0.02 g/l) at 12 ml/hr for 170 min. Secretin (2.0 clinical U/kg) was administered at 60, 90, and 120 min after the initiation of perfusion. The mean phenol red concentration was 107.37 ± 1.04% for controls and 107.31 ± 1.34% for the secretin group. No significant difference between the two groups could be proved ($p<0.05$). Glucose absorption decreased with increasing perfusion time in both groups. It was reduced by about 0.386 μmol/10 min after secretin administration and 0.410 μmol/10 min in controls. The mean value of glucose absorption in controls (24.5 ± 7.7 μmol/10 min) was not significantly different from that after secretin administration (23.4 ± 7.3 μmol/10 min; $p<0.05$). Galactose uptake showed no significant difference between controls (14.8 mM) and secretin-treated animals (15.4 mM after 5.0 clinical U; $p<0.05$). The maximum volume was 4.33 μmol/ml tissue water/min in controls and 4.23 μmol/ml tissue water/min in secretin-treated animals. Incubation with 3-0-methylglucose gave similar results ($p< 0.05$). The results demonstrate that repeated i.v. injections of secretin (2 clinical U/kg body weight) had no effect on the jejunal glucose absorption and net water movement in *in vivo* perfusion studies of the rat.

5384 INHIBITION OF SODIUM INTESTINAL TRANSPORT AND MUCOSAL (Na^+-K^+)-ATPase IN EXPERIMENTAL FANCONI SYNDROME.

(Eng.) Wapnir, R. A.; Exeni, R. A.; McVicar, M.; De Rosas, F. J.; Lifshitz, F. (North Shore Univ. Hosp., Manhasset, NY 11030). *Proc. Soc. Exp. Biol. Med.* 150(2):517-520; 1975.

The *in vivo* intestinal transport of electrolytes, glucose, amino acids, and (Na^+-K^+)-ATPase was studied in male Wistar rats, following the induction of experimental Fanconi syndrome, to determine whether damage comparable to that in the kidney occurs in the intestinal mucosa. The rats received either 1.5 or 9.0 mmol/kg of 0.15 M maleic acid, i.p., which induced renal alterations similar to those in the Fanconi syndrome. In addition, the intestinal sodium absorption in the maleate-treated animals was decreased from a mean level of 165.8 μEq/min/cm in saline-treated controls to 94.0 μEq/min/cm in animals treated with the lower dose of maleic acid and 51.7 μEq/min/cm in those treated with its higher dose. When the sodium concentration in the perfused buffers was reduced from 140 mEq/l to 78 mEq/l, the absorption of this ion ceased, and a blood-to-lumen secretion occurred at equal rates in animals given maleate or in controls. When the sodium concentration was further reduced to 26 mEq/l, the sodium secretion intensified in controls, but was not further modified in the maleate-treated animals. There was a marked transfer of potassium from the circulation to the intestinal lumen during perfusions with solutions combining intermediate or low sodium levels in the controls. Experimental animals secreted only small amounts of potassium when 78 mEq/l sodium was perfused, and potassium was absorbed when the sodium perfusate was reduced to 26 mEq/l. The (Na^+-K^+)-ATPase activity was decreased from a mean level of 317.2 nmol P hydrolyzed/min/mg protein in controls to 218.5 and 185.7 nmol in animals treated with the lower and higher maleate doses, resp. No changes occurred in the intestinal transport rates of L-lysine, glycine, L-phenylalanine, or α-aminoisobutyric acid perfused separately at 1 mM; similarly, the absorption rates for glucose in buffers, either at 20 or 40 mM, was the same as in controls. The results show that the same effects on (Na^+-K^+)-ATPase occur in the intestinal mucosa as in the kidney after maleate administration. These experiments indicate that only the translocation of electrolytes mediated by (Na^+-K^+)-ATPase is altered. The entry of amino acids into the intestinal cells may not be an energy-dependent process.

5385 SODIUM PUMPS AND GALACTOSE TRANSFER IN THE SHORT-CIRCUITED SMALL INTESTINE.

(Eng.) Ude, J. F.; Barry, R. J. C. (Dept. Physiology, Univ. Ibadan, Ibadan, Nigeria). *Experientia* 32(2):188-190; 1976.

The capacity of the rat jejunum to transfer sodium, and the relation between the electrogenic and neutral sodium pump were investigated, using a short-circuiting technique. When midjejunal sacs were everted and short-circuited in the presence of 28 mM galactose, α-methyl glucoside, or 3-*O*-methyl glucose, the mean net Na transfers (49.9, 52.1, and 53.2 μmol, resp.) were not significantly different from those obtained without added sugar (48.9 μmol). The mean net fluid transfer was 0.13 ml without added sugar and 0.19, 0.21, and 0.16 ml with galactose, α-methyl glucoside, and 3-*O*-methyl glucose, resp. When the sacs were short-circuited in the presence of 28 mM glucose, there was a significant increase in both mean Na transfer (75.9 μmol, $p<0.001$) and in fluid transfer (0.40 ml, $p<0.001$); in the presence of fructose, Na transfer increased to 61.8 μmol ($p<0.01$) and fluid transfer increased to 0.24 ml ($p<0.001$). Galactose, α-methyl glucoside, 3-*O*-methyl glucose, and glucose are actively transferred in the rat jejunum, and all gave rise to an anticipated increase in the short-circuit current. Of the sugars used in these experiments, only glucose and fructose are metabolized significantly by the rat jejunum. It is concluded that under conditions of limited energy sources, the electrogenic Na pump is preferentially used when an actively transferred hexose is present; the neutral Na pump is only able to function when additional energy is available.

5386 IN VITRO INTESTINAL ABSORPTION OF SUGARS IN THE RAT. STUDY OF THE VARIATIONS IN THE CONCENTRATIONS OF ADENYLIC COMPOUNDS AND OF MINERAL PHOSPHATE IN THE MUCOSA.

(Fre.) Rozen, R.; Griffaton, G.; Faudemay, F.; Dupuy, F.; Lowy, R.; Ardouin, B.; Naon, R. (Hopital Bichat, 170, boulevard Ney, 75018 Paris, France). *Ann. Nutr. Aliment.* 29(3):179-199; 1975.

To clarify the energy phenomena that takes place in the enterocytes, the active transport of glucose, fructose, and galactose was studied *in vitro* by the jejunal loop technique in male Wistar rats. Each sugar (10 mM) was incubated with the loop at 37 C for 0-50 min. ATP, ADP, AMP, and inorganic phosphate and protein concentrations were determined in the mucosa. Concentrations of the sugars were determined in the serous membrane and mucosa of the intestine. Results show that sugar concentrations increased constantly in the serous membrane. Glucose and galactose reached a plateau in the mucosal cells; both sugars easily penetrated the enterocyte, however, their exit into the serous cells was delayed. Fructose penetrated the mucosal cells with difficulty, but its exit was easier and became increasingly so throughout the experiment. During the first 10 min of incubation, ATP concentration in the enterocyte fell sharply. After that, the decrease in ATP was related to each sugar; the decrease was linear for glucose, oscillating for galactose, and arrested for fructose. The energy output for the active transport of the sugars was found to be about 40 cal/mol (linear regression coefficient of the ATP time course after the first 10 min). During the first 10-15 min of incubation, the concentration of the inorganic phosphate increased in the mucosal cells and then stabilized. In the case of fructose, this was caused entirely by nucleotide deterioration, while in that of the two actively transported sugars, nucleotide catabolism produced less inorganic phosphate than expected. It is suggested that the active transport of these sugars does not require much energy and that a carrier common to the sugars and the inorganic phosphate may facilitate absorption.

5387 EFFECT OF EXTRINSIC DENERVATION ON ENDOGENOUS NORADRENALINE AND [^{3}H]NORADRENALINE UPTAKE IN THE GUINEA-PIG COLON.

(Eng.) Gabella, G.; Juorio, A. V. (Dept. Anatomy, Univ. Coll. London, Gower St., London WC1E 6BT, England). *J. Neurochem.* 25(5):631-634; 1975.

Because the guinea pig proximal colon contains adrenergic fibers originating partly from intramural neurons and partly from extrinsic neurons of the prevertebral ganglia, the distribution of catecholamines in the proximal colon of guinea pigs was studied. The effect of extrinsic denervation on the catecholamine content was also studied. The colons were removed and dissected into the longitudinal muscle-submuscle-myenteric plexus and the circular muscle-submucous plexus-submucosa-mucosa. No significant difference was observed between different portions of the colon in the content of fluorometrically-determined noradrenalin. Five days after extrinsic denervation, there was a fall in the noradrenalin content in all segments of the proximal colon; in four subdivisions of the longitudinal muscle myenteric plexus (I, II, III, and IV), the mean control levels of noradrenalin were 0.86, 0.97, 0.87, and 0.70 μg/g tissue, resp., while after denervation the levels were 0.23, 0.21, 0.35, and 0.50 μg/g, resp. In the four subdivisions of circular muscle-submucous plexus-submucosa-mucosa, the control levels were 0.70, 1.10, 0.88, and 0.75 μg/g, resp., and after denervation, they were 0.04, 0.01, 0.10, and 0.42 μg/g, resp. The smaller and more variable changes observed in the fourth segment were interpreted as resulting from an incomplete extrinsic denervation, which was due to technical difficulty. In the longitudinal muscle-myenteric plexus, the uptake of tritiated noradrenalin *in vitro* was of similar degree in all segments of the colon in control animals, while in the denervated colon, the uptake was usually less than that in controls. The colons from two control animals were incubated with tritiated noradrenalin and processed for autoradiography in light microscopy. Silver grains appeared mainly on the circular musculature. In the myenteric plexus, the granules were observed both on the connecting strands and on the ganglia. Because denervation caused a nearly complete depletion of noradrenalin in the circular muscle-submucous plexus-submucosa-mucosa, it appears that the intrinsic neurons do not project to the circular musculature, or the submucosa or mucosa.

ABSORPTION - EXCRETION - TRANSPORT

5388 EXPERIMENTAL LYMPHATIC OBSTRUCTION AND FAT ABSORPTION IN THE RABBIT. (Eng.) Planche, N. E.; Hage, G.; Montet, A. M.; Sarles, H. (Unite de Recherches de Pathologie digestive U-31 de l'INSERM, 46, chemin de la Gaye, F-13009, Marseille, France). *Digestion* 13(4):255-258; 1975.

To determine why the increased fecal fat excretion following experimentally induced lymphatic obstruction could not be reproduced in subsequent experiments, the influence of different environmental conditions, treatment for intestinal parasites, season, and diet on fecal fat excretion was studied in 24 rabbits with lymphatic obstruction and 10 controls. Four animals with lymphatic obstruction and two controls received a standard UAR diet supplemented with bread and raw carrots and were followed up for 2-7 months and 15 days to 3 months, resp. Five animals with obstruction and five controls received the standard diet supplemented with raw carrots only, and were followed up for 1-13 months and 2-11 months, resp. Five animals with obstruction and five controls received the standard diet alone and were followed up for 6-14 months and 4-9 months, resp. Nine animals with obstruction and three controls were not given Bifuran for the control of parasites. Three experimental animals and three controls were kept outside from February to July, and the remaining animals were kept in a room at 20 ± 2 C. The fecal fat excretion was not different in controls and animals with lymphatic obstruction. It was not dependent on the different conditions of diet, antiparasitic agents, or temperature, but there were significant seasonal variations; there was a summit in October-November 1968 and September-October 1969, with the lowest values in August 1969. It is concluded that lymphatic obstruction does not modify the fecal fat excretion in rabbits. This is probably due to the importance of the lymphovenous shunts. The different diets, temperature variations, and the use of antiparasitic agents do not explain the discrepancies between the authors' initial results and those presently reported.

5389 IN VIVO STUDIES ON THE PERMEABILITY, ELECTRICAL POLARIZATION AND TRANSMURAL TRANSPORT OF WATER AND MONOVALENT IONS IN NORMAL AND INFLAMED HUMAN LARGE INTESTINE. (Dan.) Madsen, J. R. (Dronning Louises Vej 1, 2920 Charlottenlund, Denmark). *Ugeskr. Laeger* 137(45):2638-2639; 1975.

5390 TRANSPORT OF PEPTIDES. (Pol). Tomaszewski, L. (Zaklad Analityki Klinicznej Instytutu Biofarmacji AM, 02-097 Warsaw, Poland). *Pol. Tyg. Lek.* 31(4):163-166; 1976.

5391 EFFECT OF HISTAMINE ON THE TRANSPORT OF NONELECTROLYTES THROUGH THE GASTRIC MUCOSA IN Rana esculenta. (Ita.) Schettino, T.; Lippe, C. (Istituto di Fisiologia Generale, Universita di Bari, Bari, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(7/8):537-540; 1976.

5392 DIGESTION AND ABSORPTION OF ALIMENTARY TRIGLYCERIDES. (Fre.) Clement, J. (U.E.R. Nutrition Sciences-Mirande, Campus Universitaire, 21000 Dijon, France). *J. Physiol. (Paris)* 72(2):137-170; 1976.

See also, 5505, 5728.

MOTILITY

5393 THE EFFECT OF GASTRIN AND SECRETIN ON GASTRIC EMPTYING IN MAN. (Ger.) Meves, M.; Beger, H. G.; Huthwohl, B. (Klinikum Charlottenburg, Freien Universitat, Berlin, Germany). *Z. Gastroenterol.* 13(4):464-467; 1975.

To examine the effect of secretin and gastrin on gastric emptying in man, a ^{51}Cr-labeled meal was administered to 24 healthy test subjects. The movement of the meal from the stomach was measured by analog recording of activity-time curves over the gastric region, using two dorsally and ventrally located scintillation detectors. One group of patients was given an infusion of natural hog gastrin I (2 μg/kg), a second group was given pentagastrin (6 μg/kg), and a third group was given pure natural secretin (75 clinical U). The scintigrams revealed that the fundus/corpus region performs the storage function in the stomach. The rate of gastric emptying in the 30 min prior to gastrin administration was 19.1%; it decreased to 5.0% during the 20-min gastrin infusion, then increased to 10.9% after the infusion was ended. In the pentagastrin group, gastric emptying was decreased from 21.5% during the pre-infusion period to 2.6% during the infusion. In the patients given secretin, gastric emptying decreased from 26.2% in the 30 min before infusion to 5.5% during the infusion. The decrease lasted for an average of 17 min after the end of secretin administration, and the rate of emptying increased to 11.9%. The results support earlier studies, which indicate that exogenous gastrin inhibits gastric emptying, not only by altering the motor conditions in the antrum, but also by way of an increase in duodenal pressure.

5394 GASTRIN INHIBITION OF THE PYLORIC SPHINCTER.

(Eng.) Fisher, R. S.; Boden, G. (Temple Univ. Health Sciences Center, 3401 N. Broad St., Philadelphia, PA 19140). *Am. J. Dig. Dis.* 21(6):468-472; 1976.

Experiments were carried out in 10 normal subjects to determine whether gastrin, administered exogenously as pentagastrin or released endogenously from the antral mucosa, can inhibit the normal pyloric responses to intraduodenal stimuli. Pyloric sphincter pressure increased significantly in response to the intraduodenal instillation of hypertonic amino acids (20 g in 100 ml water), sodium oleate (30 ml), and 0.1 normal concentration HCl (7.6 ml/min), from a basal level of 4.2 ± 0.9 mm Hg to 14.5 ± 1.4 mm Hg ($p<0.01$), 13.3 ± 0.8 mm Hg ($p<0.001$), and 21.1 ± 1.8 mm Hg ($p<0.001$), resp. Duodenal acidification increased pyloric pressure from a resting level of 5 mm Hg to 17 mm Hg. In contrast, the pyloric pressure during i.v. pentagastrin infusion (2 μg/kg/hr) did not significantly change in response to acidification, remaining at 5 mm Hg. During pentagastrin infusion, the pyloric pressure responses were significantly decreased, to 3.4 ± 1.1 mm Hg when HCl was infused ($p<0.001$), to 2.4 ± 1.5 mm Hg when oleate was infused ($p<0.001$), and to 6.2 ± 3.8 mm Hg when hypertonic amino acids were infused ($p<0.05$). Similarly, the intragastric instillation of a mixture of 1.5% glycine (200 ml) and 0.1 normal concentration NaOH (100 ml) resulted in obtunded pyloric responses to these same intraduodenal solutions; pressures were decreased to 5.3 ± 1.5 mm Hg ($p<0.001$) with pentagastrin, 5.7 ± 1.4 mm Hg ($p<0.001$) with HCl, and 4.0 ± 1.5 mm Hg ($p<0.01$) with hypertonic amino acids. Neither pentagastrin infusion alone nor intragastric infusion of glycine and NaOH altered pyloric sphincter pressures from their basal levels. The results suggest that excess serum gastrin concentrations may produce pyloric dysfunction.

5395 A COMPARISON BETWEEN THE EFFECTS OF CERULEIN AND CHOLECYSTOKININ-PANCREOZYMIN ON THE ELECTRIC AND MANOMETRIC ACTIVITIES OF THE HUMAN STOMACH.

(Fre.) Bortolotti, M.; Labo, G. (II^{a} General Medical Clinic and Medical Therapy, Via Massarenti 9, I 40138, Bologna, Italy). *Acta Gastroenterol. Belg.* 38(3/4):111-124; 1975.

The electrical and mechanical activity of the stomach antrum was studied with a suction needle electrode and an air-filled balloon in 23 normal subjects, during and after the i.v. administration of cerulein (15 subjects, 0.5-12.5 ng/kg/min) and cholecystokinin-pancreozymin (CCK-PZ; 8 subjects, 1-8 Ivy dog U/kg/hr). Both substances inhibited electrical and manometric activity proportional to the dose. After administration ceased, there was an increase in electrical and manometric activity above base values. Cerulein was five times as effective as CCK-PZ by weight (3.4 ng/kg/min versus 17.1 ng/kg/min) to obtain a 20% decrease, and the molecular activity ratio was 1.7 (1.352 for cerulein and 3.883 for CCK-PZ). It is known that cerulein and CCK-PZ are also intestinal stimulants (by activation of cholinergic nervous system). However, in this study, their inhibitory effects were dominant. This inhibiting action limits the use of cerulein as a therapeutic agent (e.g., in paralytic ileus), especially if there is gastric ileus.

5396 THE EFFECT OF SECRETIN AND CHOLECYSTOKININ-PANCREOZYMIN ON SMALL INTESTINE MOTILITY IN MAN.

(Ger.) Dollinger, H. C.; Berz, R.; Bargon, G.; von Uexkull, T.; Goebell, H. (Sektion Gastroenterologie, Zentrum fur Innere Medizin, Universitat Ulm/Donau, D-79 Ulm/Donau, Steinhavelstrasse 9, W. Germany). *Z. Gastroenterol.* 13(4):479-481; 1975.

The effects of secretin and cholecystokinin (CCK) on small intestinal motility were examined in healthy volunteers. In the first group of test subjects (four for each hormone), the motor activity of the jejunum was measured using a pressure-sensitive endoradiocapsule. In the second group of five subjects, the transit time of a contrast medium (barium sulfate) from the duodenojejunal flexure to the ileocecal valve was measured by x-ray. In comparison to the control period, the infusion of secretin at 1 U/kg/hr, i.v., resulted in a slight decrease in the number of waves (from 27.6 ± 6.2 for controls to 19.7 ± 6.2), and amplitude index (from 171 ± 53.4 for controls to 100.2 ± 48.3 cm H_2O), the motility index (from 4.2 ± 1.3 for controls to 1.9 ± 0.9), and the percentage of motor activity (from 11.2 ± 2.7 for controls to 5.9 ± 2.1%). The higher dosage of secretin, 2 U/kg/hr, produced a greater (statistically significant) decrease in all four parameters. The number of waves decreased to 7.7 ± 3.4 ($p<0.025$), the amplitude index to 40.2 ± 30.3 cm H_2O ($p<0.025$), the motility index to 0.9 ± 0.8 ($p<0.05$), and the motor activity to 2.3 ± 1.7% ($p<0.0125$). The small intestinal transit time of the contrast medium was shortened by secretin in a dose-dependent manner. CCK, on the other hand, stimulated the spontaneous motor activity of the jejunum. After CCK administration at 1 U/kg/hr, the number of waves increased from 27 ± 2.1 for controls to 36.7 ± 7.9, the amplitude index from 132.3 ± 38.8 for controls to 267.5 ± 84.3 cm H_2O ($p<0.05$), the motility index from 3.0 ± 1.1 for controls to 7.0 ± 2.4 ($p<0.05$), and the motor activity from 9 ± 1.7 for controls to 15.2 ± 4.3%. CCK at 2 U/kg/hr resulted in an increase in the number of waves to 70.1 ± 12.2 ($p<0.025$), the amplitude index to 693.5 ± 275.0 cm H_2O ($p<0.025$), the motility index to 18.4 ± 8.8 ($p<0.025$), and the motor activity of 28.9 ± 7.7% ($p<0.05$). A cholinergic mechanism has been suggested for the action of CCK.

MOTILITY

5397 EFFECTS OF NORMOBARIC AND HYPERBARIC HYPEROXIA ON THE DIGESTIVE MOTILITY OF THE RABBIT. I. ANTRAL-PYLORIC MOTILITY. (Fre.) Santini, R.; Dumas, J.; Peres, G.; Brard, E. (Laboratoire de Physiologie et Pharmacologie, I.N.S.A. Bat 406, 20 avenue Albert Einstein, 69621 Villeurbanne, France). *Soc. Biol. Lyon* 169(6):1534-1542; 1976.

Antral-pyloric electromyograms recorded motility of the pyloric antrum of seven adult male rabbits exposed to hyperbaric and normobaric atmospheres. After implantation of electrodes, animals were exposed to an atmosphere of pure oxygen at either normal (PO_2=673 mm Hg) or elevated (PO_2=1682 or 2592 mm Hg) pressures. Motility of the pyloric antrum was not affected by a normobaric hyperoxia of short duration (20-30 min). There was a notable inhibition of motility when normobaric hyperoxia lasted over 6 hr or during a hyperbaric hyperoxia. This inhibition is independent of the speed at which the pressure is established in the chamber as well as of the time of day.

5398 EFFECTS OF CT-1341 (ALTHESIN-GLAXO) ON SPONTANEOUS CONTRACTION OF ISOLATED RABBIT JEJUNUM. (Jpn.) Namiki, A.; Asai, H.; Takahashi, T. (Sapporo Medical Coll., Japan). *Sapporo Med. J.* 43(5):356-361; 1974.

5399 EFFECTS OF DRUGS ON ISOLATED RAT COLON AND DUODENUM--A COMPARISON. (Jpn.) Koshiba, H. (Fukushima Medical Coll., Fukushima 960, Japan). *Folia Pharmacol. Jpn.* 71(5):415-426; 1975.

5400 A NEW METHOD OF THE ANALYSIS OF GASTROGRAMS AND SOME IMPROVEMENTS IN BALLOON KYMOGRAPHY. (Rus.) Shirokova, K. I.; Chistova, S. V.; Shmyrkov, O. V. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med.* 54(3):29-33; 1976.

5401 METHOD OF INVESTIGATING ELECTRICAL ACTIVITY OF THE STOMACH AND DUODENUM. (Pol.) Zajac, S. (01-708 Warszawa, ul. Lampego 10 m. 61, Poland). *Pol. Tyg. Chir.* 48(4):459-466; 1976.

5402 SMALL INTESTINAL MOTILITY. CLINICAL RECORDING OF ELECTRICAL SPIKE POTENTIALS AND INTRALUMINAL PRESSURE VARIATIONS. (Dan.) Oigaard, A. (No affiliation given). *Ugeskr. Laeger* 137(40):2316-2317; 1975.

5403 MANOMETRIC INVESTIGATIONS OF THE INTESTINAL SPHINCTER IN CONTINENT ILEAL BLADDER IN THE DOG. (Ger.) Leisinger, H. J.; Schauwecker, H.; Schmucki, O.; Sauberli, H. (Urologische Universitatsklinik, Kantonsspital, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Helv. Chir. Acta* 43(1/2): 191-194; 1976.

5404 DYNAMIC SIMULTANEOUS RADIOCINEMATOGRAPHIC AND MANOMETRIC INVESTIGATIONS OF THE FUNCTION OF THE LOWER ESOPHAGEAL SPHINCTER. (Ger.) Schauwecker, H. H.; Otto, R.; Sauberli, H.; Geroulanos, S.; Largiader, F. (Chirurgische Universitatsklinik A, CH-8091 Zurich, Switzerland). *Helv. Chir. Acta* 43(1/2):169-172; 1976.

5405 MOTOR FUNCTION OF THE STOMACH IN HEALTHY CHILDREN OF 3-15 YEARS OLD ACCORDING TO ELECTROGASTROGRAPHY DATA. (Rus.) Disenbaeva, L. G.; Khorunzyi, G. V. (Rostov-na-Donu Medical Inst., Rostov-na-Donu, USSR). *Pediatriia* (3):21-24; 1976.

5406 MICROCIRCULATION OF THE SMALL INTESTINE AT VARIOUS PHASES OF ITS MOTOR ACTIVITY. (Rus.) Kulik, V. P.; Maksimenkova, A. N.; Finikova, L. S. (Patrice Lumumba Univ. of Peoples' Friendship, Dept. Anatomy, Moscow, USSR). *Biull. Eksp. Biol. Med.* 81(3):261-263; 1976.

See also, 5489, 5505, 5547, 5548, 5589, 6061.

SECRETION AND METABOLISM

5407 SUPPRESSION OF α-FETOPROTEIN PRODUCTION BY EXTRACTS OF VARIOUS TISSUES. (Eng.) Svet-Moldavskii, G. Y.; Tumyan, B. G.; Karmanova, N. V.; Barkhotkina, M. F. (Acad. Medical Sci. USSR, Moscow, USSR). *Bull. Exp. Biol. Med.* 79(2):171-173; 1975.

The factor that inhibits α-fetoprotein production in newborn rats and mice was studied using the syngeneic serum and 20% extracts of various organs (large and small intestine, liver, kidney, spleen, and striated muscle) of adult BALB/C mice. Extracts were also prepared from the small intestine of 21-day-old mice and from organs of mouse embryos taken during the last days of pregnancy; extracts prepared from whole mouse embryos were also used. Litters of mice were divided into two groups, one of which served as the untreated control; the other group received 0.1 ml of serum or extract, s.c., from the 1st through 4th days of life, 0.2 ml on the 5th and 6th days, 0.3 ml on the 7th day, and 0.5 ml on the 8th and 9th days. In comparison with controls, the α-fetoprotein production in the animals treated with serum or intestine, kidney, or spleen extracts of adult mice was inhibited. The titer of α-fetoprotein in mice treated with serum was 32 versus 512 in controls; 32-64 versus 512 with small intestine; 32-64 versus 256-512 with large intestine; 32-64 versus 256 with kidney; and 64 versus 512 with spleen. In newborn mice treated with the small intestine of 21-day-old mice, the α-fetoprotein titer remained at 64, while the titers in controls were either 128 or 256, depending upon the litter. In newborns treated with liver extract from adult mice, the α-fetoprotein titer was 64, while the titer in controls was 256. In contrast, the titers remained essentially unchanged among controls and newborn mice treated with muscle extract of adult mice or whole embryo extracts. The authors conclude that the α-fetoprotein-inhibiting factor present in adult tissues either acts on α-fetoprotein synthesis in embryonic liver cells or suppresses the proliferation of these cells.

5408 GASTRIN: RECENT PHYSIOLOGICAL DATA. (Fr .) Fournet, J. (Pav. A - Gastroenterologie, C.H.U. Grenoble, Grenoble, France). *Rev. Fr. Gastroenterol.* (115):7-22, 1976.

See also, 5368, 5414, 5574.

SECRETION AND METABOLISM

STOMACH

5409 DEMONSTRATION OF A CYTOCHEMICAL DIFFERENCE BETWEEN THE TUBULOVESICLES AND PLASMALEMMA OF GASTRIC PARIETAL CELLS BY ATPase AND NPPase REACTIONS. (Eng.) Rubin, W.; Aliasgharpour, A. A. (Medical Coll. Pennsylvania, Philadelphia, PA 19129). *Anat. Rec.* 184(2):251-255; 1976.

Factors that distinguish between the plasmalemma and the tubulovesicles in the gastric mucosa were investigated using cytochemical reactions that have been associated with plasmalemma. Pieces of rat and human gastric mucosa were fixed in glutaraldehyde and paraformaldehyde and were processed for the cytochemical demonstration of ATPase and p-nitrophenylphosphatase (NPPase). Electron microscopy revealed that the ATPase reaction was localized to the plasmalemma and to mitochondrial cristae, and the NPPase reaction was localized to the plasmalemma. The tubulovesicles were unreactive. This cytochemical difference between the plasmalemma and tubulovesicle membrane suggests that the tubulovesicles do not represent an extension of or reserve of mature plasmalemma. If the tubulovesicles represent a reserve of membrane that can be rapidly utilized to expand the plasmalemma, additional membrane constituents are apparently added, activated, or unmasked in the process.

5410 "IN VITRO" MUCIN BIOSYNTHESIS BY HUMAN GASTRIC MUCOSA BIOPSIES. (Eng.) Decaens, C.; Robert, L.; Mignon, F.; Bader, J. P. (Laboratoire de Biochimie du Tissu Conjonctif, Hopital Henri-Mondor, Universite Paris-Val de Marne, Creteil, France). *Biomedicine* 23(9):361-363; 1975.

A functional test of mucin biosynthesis in gastric biopsy samples obtained from four normal human subjects is described. The test involved the estimation of the rate of incorporation of appropriate labeled precursors into secreted and cell-bound mucins. Antral and fundic biopsy samples were incubated for 4 hr with 2 μCi U-^{14}C-glucose (240 mCi/mM). The total protein content (fundus + antrum) of the samples was an average of 800 μg, with no significant difference between the antral and fundic regions. The DNA content of the tissue residues was an average of 30 μg (± 20%). The tissue samples actively incorporated the ^{14}C-glucose from glycoproteins, which was partially released in the medium and partially retained in the tissue residue. The specific radioactivity of both medium (117,250 ± 12,900 counts/min/mg protein) and the tissue residue (137,500 ± 33,700 counts/min/mg protein) were remarkably high, with no distinct differences between the antral and fundic regions. When radioactivity was expressed on both protein and DNA bases, relatively constant results were obtained. These preliminary results are encouraging for the further development of this method.

5411 THE ROLE OF CHOLINERGIC EXCITATION IN THE FORMATION OF HISTAMINE WITHIN THE RAT GASTRIC MUCOSA. (Eng.) Lundell, L. (Dept. Physiology Biophysics, Univ. Lund, Lund, Sweden). *Acta Physiol. Scand.* 97(2):145-149; 1976.

The significance of local cholinergic and long vagovagal reflexes for the formation of histamine was investigated upon distension of the gastric remnant after antrectomy in female Sprague-Dawley rats. In the fasting state, the mean rate of mucosal histamine formation was 4.8 μg/g/3 hr, which was decreased by the administration of atropine (1 mg/kg). Truncal vagotomy was followed by a further decrease in mucosal histamine formation to 2.4 μg/g/3 hr. When unoperated rats received an injection of 2-

deoxy-D-glucose (50 mg/kg) 3 hr before sacrifice, the mean histamine level was 10.9 μg/g/3 hr; this increase was abolished by atropine, which caused the level to drop to 4.6 μg/g/3 hr, and by truncal vagotomy, which made the level drop to 3.2 μg/g/3 hr. Continuous distension failed to affect the rate of histamine formation, whereas intermittent distension was highly effective in the presence of vagal innervation, raising the level to 9.7 μg/g/3 hr, and after truncal vagotomy (7.1 μg/g/3 hr). The failure of continuous distension to increase the rate of histamine formation was presumably due to impaired gastric blood flow, since the mucosa was pale and edematous.

5412 THE MECHANISM WHEREBY GROWTH HORMONE-RELEASE INHIBITING HORMONE (SOMATOSTATIN) INHIBITS FOOD STIMULATED GASTRIC ACID SECRETION IN THE CAT. (Eng.) Albinus, M.; Blair, E. L.; Grund, E. R.; Reed, J. D.; Sanders, D. J.; Gomez-Pan, A.; Schally, A. V.; Besser, G. M. (Dept. Physiology, Univ. Newcastle upon Tyne, Newcastle upon Tyne, England). *Agents Actions* 5(4):306-310; 1975.

The suggestion that the reduction in gastric secretion occurring after the administration of growth hormone-release inhibiting hormone (GH-RIH) could be secondary to a fall in the plasma gastrin concentration was investigated in cats with gastric fistulae. When GH-RIH (10 μg/kg/hr, i.v.) was infused for 1 hr starting 5 min before feeding, the gastric acid secretion was reduced by 96%, but the mean peak serum gastrin concentration 5 min after feeding was not significantly different from controls. When GH-RIH infusion was started 30 min before feeding, the peak serum gastrin was abolished, but the gastrin concentration did not fall below basal levels. Gastric acid secretion remained almost totally inhibited. The mean volumes of gastric juice and food recovered 15 min after feeding were 39.0 ml when the infusion was begun 5 min before feeding and 42.4 ml when the infusion was begun 30 min before feeding. By feeding 15 or 45 min after the end of the 1-hr infusion, no significant reduction of either the immediate prefeeding serum gastrin concentration or the 15-min postfeeding serum gastrin concentration occurred compared with controls. The gastric acid secretory responses were not reduced compared with the control values. There was, however, a significant reduction in the volume of gastric juice and food recovered after feeding when the GH-RIH infusion ended 15 min before feeding (45 ml, $p<0.001$) but not when the infusion ended 45 min before feeding (46.4 ml, $p>0.1$). Since the inhibition of gastrin release is delayed relative to that of acid secretion, the inhibition of food-stimulated acid secretion must occur by a primary effect on the acid secretory mechanism.

5413 COMBINED EFFECT OF GLUCAGON AND CHOLECYSTOKININ ON GASTRIC SECRETION IN MAN. (Eng.) Hendel, L.; Jorgensen, S. P.; Christiansen, J.; Henriksen, F. W. (Glostrup Hosp., Glostrup, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 37):43-46; 1976.

The question of whether glucagon and cholecystokinin interact in their inhibitory effect on gastric secretion was investigated in seven normal volunteers. Pentagastrin (1 μg/kg/hr, i.v., 2 hr)-stimulated gastric secretion of fluid was inhibited by a mean of 29% when glucagon (20 μg/kg/hr, i.v.) was infused simultaneously. When glucagon was infused in combination with cholecystokinin (0.5 Ivy dog U/kg/hr), secretion was inhibited by 30%, but when cholecystokinin was infused alone, there was only a 14% decrease. The inhibition of gastric acid secretion was slightly more pronounced than the inhibition of fluid secretion, and amounted to 36% with glucagon alone, 44% with glucagon and cholecystokinin combined, and 15% with cholecystokinin alone. The dose of glucagon provoked nausea and sometimes vomiting in all subjects, indicating that this dose may be too large to be within the physiological range. This study did not demonstrate any increased inhibition of gastric acid secretion by glucagon and cholecystokinin. However, the investigation does not exclude the possibility of interaction at lower dose levels as the dose of glucagon may be pharmacological.

5414 THE EFFECT OF ANTRECTOMY ON GASTRIC ACID AND GASTRIN SECRETION. (Eng.) Ashby, D. B.; Himal, H. S. (Dept. Experimental Surgery, McGill Univ., Montreal, Quebec, Canada). *Surg. Gynecol. Obstet.* 141(6):888-890; 1975.

To elucidate the intestinal phase of gastric secretion, experiments were carried out in three Heidenhain pouch dogs to determine if duodenal gastrin is released in response to a protein meal. The ingestion of a meal consisting of 250 g of beef liver plus 400 ml of water resulted in increased pouch acid output and serum gastrin secretion. Acid output began to increase during the first 20-min and peaked at 30 min. Gastrin secretion began to increase at 5 min and peaked at 30 min. When these experiments were repeated following antrectomy and a Billroth I gastroduodenal anastomosis, the acid output did not significantly change from basal volumes in the first 60-min following the test meal. After 60 min, there was a consistent rise, reaching a maximum output of 0.10 ± 0.08 mEq/10 min at 150 min; this persisted throughout the 240-min test period. The serum gastrin levels did not significantly change throughout the test period. The results indicate that antrectomy abolishes the early rise in acid and gastrin secretion in response to a protein test meal. Since gastrin levels did not significantly change throughout the entire experiment, the late increase in acid output must be due to a mechanism other than gastrin release.

5415 EFFECTS OF BY-PASSING THE JEJUNUM ON MUCOSAL SECRETION IN THE PIG. (Eng.) McCance, R. A.; Stoddart, R. W.; Artavanis, C.; Wilkinson, A. W. (Sidney Sussex Coll., Cambridge CB2 3HU, United Kingdom). *Biochem. Soc. Trans.* 4(1):151-154; 1976.

The effects of jejunal bypass on mucosal goblet cell secretion were investigated in 10-day-old Large White piglets by fluorescent-labeled lectins. The bypassed jejunum was dosed at the proximal end and left *in situ*. Small samples of mucosa were removed from the upper and lower thirds of each normal jejunum and from the corresponding parts of the bypassed organs of the experimental pigs soon after death. Duodenal and ileal tissues were also taken. The duodena and ilea of operated animals were almost identical with those of controls. In the normal animals, the lectins showed patterns of staining of the duodenum similar to the upper and lower third of the jejunum. The mucin of the goblet cells was stained with fluorescent-labeled concanavalin A in cells in the lower halves of the villi and crypts. With *Ricinus* agglutinin, they were stained on the sides of the villi, and with fluorescent-labeled aprotinin, they were stained on the sides and especially at the tips of the villi. In the operated animals, the bypassed jejunum showed a reversed pattern of staining, with fluorescent-labeled concanavalin A staining mucin in cells near the tips of the villi, *Ricinus* agglutinin staining a few cells near the crypt, and fluorescent-labeled aprotinin staining the goblet cells generally. In the jejunum of the control animals, Meissner's plexus was extensively stained with fluorescent-labeled concanavalin A, but in that of the operated animals, the plexus appeared to be greatly disorganized in the dilated parts of the blind arm, and was difficult to find. In the duodenum of the operated animals, the plexus was well stained and resembled that of control animals. The results show that fluorescent labeling may form a suitable model for the biochemical investigation of the control of mucin synthesis and its relation to the migration of the intestinal epithelium.

5416 EFFECT OF PYLOROTOMY ON INHIBITION OF GASTRIC SECRETION BY INTESTINAL ACIDIFICATION.

(Eng.) Pober, Z. (Food Sciences Lab., U.S. Army Natick Development Center, Natick, MA 01760). *Am. J. Dig. Dis.* 21(6):448-452; 1976.

Factors involved in the inhibition of gastric secretion by small intestinal acidification were investigated in six dogs with gastric fistula. The gastric secretory response to single s.c. injections of either histamine (0.1 mg/kg) or pentagastrin (6 μg/kg) was measured before and after pylorotomy in each dog. Pentagastrin without acidification produced a mean, peak total acid output, of 19.80 mEq/hr. Intestinal acidification with HCl (0.1 normal concentration) markedly inhibited pentagastrin-stimulated gastric secretion, making the mean peak total acid output 8.89 mEq/hr. The response to pentagastrin without acidification was unaffected by pylorotomy (22.02 mEq/hr), indicating that the stomach was still capable of secreting. Intestinal acidification continued to produce a marked decrease in secretion, even at 24 hr after the surgery (5.87 mEq/hr), indicating that the inhibitory mechanism was still functioning. Similar results were obtained with histamine-stimulated gastric secretion. Intestinal acidification increased the prepylorotomy value from 18.91 mEq/hr to 6.97 mEq/hr; postpylorotomy, acidification increased the value from 21.02 mEq/hr to 14.65 mEq/hr. The results indicate that there is an enterogastric reflex through the myenteric plexus, which controls the inhibitory mechanism.

5417 SECRETION AND IRRIGATION OF GASTRIC MUCOSA DURING DISULFIRAM EFFECT. EXPERIMENTAL STUDY IN THE DOG.

(Eng.) Lamboeuf, Y.; Saint-Blanquat, G. de; Derache, R. (Groupe de Recherches sur la Toxicologie des Aliments et des Boissons INSERM U-87, 2 rue Francois Magendie, F-31.400 Toulouse, France). *Arzeim. Forsch.* 26(7):1344-1347; 1976.

5418 SIDE-EFFECTS AFTER STIMULATION OF GASTRIC SECRETION WITH PENTAGASTRIN?

(Ger.) Ewers, H. R.; Brouwers, H.-P.; Merguet, P.; Hengstebeck, W. (Medizinische Universitatsklinik und Poliklinik, 43 Essen 1, Hufelandstrasse 55, W. Germany). *Med. Klin.* 71(1):19-23; 1976.

5419 THE INFLUENCE OF PENTAGASTRIN ON THE RATIOS OF Na$^+$, K$^+$, H$^+$ AND FREE AMINO ACIDS IN GASTRIC JUICE. SHORT COMMUNICATION.

(Ger.) Dunzendorfer, U. (Zentrum der Chirurgie des Johann-Wolfgang-Goethe-Universitatsklinikums, Theodor-Stern-Kai 7, 6000 *Arzneim. Forsch.* 26(7):1364-1365; 1976.

5420 EFFECT OF CYCLIC AMP, PAPAVERINE AND URECHOLINE (BETHANECHOL CHLORIDE) ON ANTRAL GASTRIN SECRETION IN THE DOG.

(Ger.) Sauberli, H.; Krejs, G. J.; Largiader, F.; Schauwecker, H. H.; Blum, A. L. (Chirurgische Universitatsklinik A, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Helv. Chir. Acta* 43(1/2):183-186; 1976.

5421 INFLUENCE OF CHOLESTASIS INDUCED BY LIGATION OF THE DUODENUM ON THE GASTRIC SECRETION OF THE RAT.

(Ger.) Schramm, H.; Nohring, J. (Chirurgische Universitatsklinik, DDR-69 Jena, Bachstrasse 18, E. Germany). *Z. Exp. Chir.* 9(4):246-252; 1976.

5422 THE EFFECT OF INTRAVENOUS PROPRANOLOL ON THE BASAL SECRETORY ACTIVITY OF GASTRIC MUCOSA.

(Pol.) Ruminski, W. (Klinika Kardiologiczna, Instytut Chorob Wewnetrznych AM, 20-090 Lublin, ul. Jaczewskiego 8, Poland). *Pol. Tyg. Lek.* 31(14):571-574; 1976.

5423 JEJUNAL INHIBITION OF POSTPRANDIAL GASTRIC SECRETION BY FAT IN NORMAL INDIVIDUALS.

(Dan.) Christiansen, J. (Kirurgisk afdeling A, Bispebjerg hospital, DK-2400 Copenhagen NV, Denmark). *Ugeskr. Laeger* 163(9):546-548; 1976.

5424 MODERN TECHNIQUES FOR THE STUDY OF GASTRIC ACID SECRETION. (Ita.) Corinaldesi, R.; Cornia, G. L.; Luchetta, L.; Di Febo, G.; Lami, F.; Ricci, P.; Casadio, R. (Istituto di Clinica Medica II e Gastroenterologia, Univ. Bologna, Bologna, Italy). *Minerva Gastroenterol.* 21(3):102-114; 1975.

5425 ATROPINE TEST FOR ESTIMATING THE TYPE OF GASTRIC ACID SECRETION. (Rus.) Birgele, E. L.; Rancans, V. V.; Kalnins, A. E.; Linars, J. J. (Latvian Res. Inst. Experimental and Clinical Medicine, Riga, USSR). *Fiziol. Zh. SSSR* 62(4):603-608; 1976.

See also, 5368, 5372, 5397, 5492, 5494, 5506, 5517, 5554, 5617, 5665.

SECRETION AND METABOLISM

Pancreas

5426 ANTIGENIC PROPERTIES OF SUBCELLULAR FRACTIONS FROM CANINE PANCREAS: DEVELOPMENT OF A ZYMOGEN MEMBRANE SPECIFIC ANTIBODY. (Eng.) Mihas, A. A.; Gibson, R. G.; Hirschowitz, B. I.; Ostroy, F. (Div. Gastroenterology, Univ. Alabama-Birmingham, Birmingham, AL 35294). *Proc. Soc. Exp. Biol. Med.* 150(3):618-621; 1975.

A pancreas-specific autoantibody, which is regularly induced in rabbits by immunization with antigenic material prepared from dog pancreatic zymogen membranes, was characterized. The gel electrophoretograms of the zymogen membrane fraction showed only three bands of molecular weight: 62,000, 79,000, and 90,000. All three bands were PAS-positive. Homogenates prepared from dog organs other than the pancreas, including heart, lung, muscle, kidney, adrenal gland, urinary bladder, uterus, esophagus, stomach, small intestine, colon, liver, thyroid gland, parotid gland, and spleen, showed no reaction with the antiserum. The antiserum also failed to react with dog bile and blood serum, pancreozymin-cholecystokinin, secretin, chymotrypsinogen A and B, and gastrin. Pancreatic homogenates from rabbit, rat, guinea pig, and man gave a clear line of precipitation with the antibody. The antiserum failed to react when tested against homogenates of chicken and frog pancreas. When the antiserum was tested against intact zymogen granules and a zymogen granule membrane subfraction, a precipitation line was seen only with the membrane fraction, and no reaction was found with the intact zymogen granules. When the antiserum was tested with lysed zymogen granules, a clear line of precipitation was seen, suggesting that the antigenic properties of the membrane fraction are located in the inner aspect of the zymogen membrane. It may represent glycoproteins of molecular weight 70.000-90,000 as well as smaller species of molecular weight of less than 10,000. The results also demonstrate that the precipitating antibody produced by immunization with antigenic material from dog pancreatic zymogen membranes is organ-specific but not species-specific.

5427 SECRETAGOGUE ACTION OF THE DIBUTYRYL DERIVATIVE OF CYCLIC ADENOSINE MONOPHOSPHATE ON THE EXOCRINE PANCREAS OF THE RAT. (Fre.) Stock, C.; Vincent, D.; Baudin, H. (Unite INSERM N° 61, Strasbourg Hautepierre, France). *Arch. Int. Physiol. Biochim.* 84(2):348-350; 1976.

The stimulatory action of the dibutyryl derivative of cyclic adenosine monophosphate (dbAMP) on the rat pancreas is discussed. The derivative causes an outflow of pancreatic enzymes of the acinus cells. A toxic effect of dbAMP on the exocrine pancreas of the rat is unlikely because an ultrastructural study showed no histological alterations. Metabolic parameters (oxygen consumption, lactic acid, ATP, deoxyglucose transport, incorporation of ^{32}Pi in total phospholipids and phosphatidylmonoinositides) remained unchanged and the secretory stimulation was constant and reversible. As the secretagogue effects of dbAMP were not inhibited by antimuscarinic, antinicotinic, and antiadrenergic agents, mediation by a neurochemical agent is also unlikely. An interaction of dbAMP with the exocrine acinus cell is supported by the endergonic character of the secretagogue action, its calcium dependence, and the inhibition of the action by cytochalasine B. The relative need for energy suggests that this interaction may take place at the level of the final steps of the secretory cycle involved in exocytosis.

5428 PANCREATIC ENZYME RESPONSE WITH AN ELEMENTAL DIET. (Eng.) Neviackas, J. A.; Kerstein, M. D. (Veterans Admin. Hosp., West Haven, CT). *Surg. Gynecol. Obstet.* 142(1):71-74; 1976.

The effects of chemically defined or elemental diets on the pancreas were investigated in six mongrel dogs. Dogs were maintained on a regular chow diet, switched to an elemental diet (Vivonex-100), and subsequently returned to the chow diet. To study the pancreatic enzyme response to the diets, each dog had had a chronic duodenal cutaneous fistula with a Thomas cannula inserted opposite the main pancreatic duct. Pancreatic juices were collected in 15-min samples and tested for pH, volume, lipase, amylase, and trypsinogen. The pH for all samplings was 9.0. The lipase values averaged 2,200 with the regular diet and 1,300 with the elemental diet. After returning to the regular diet for 1 month, the lipase returned to pre-elemental diet levels. The amylase level averaged 180,000 Somogyi U with the regular diet, but dropped to 40,000 Somogyi U after 1 month on the elemental diet; it also returned to regular diet levels after 1 month on the regular diet. The trypsin level fell from 3,000 to 700 mU on the elemental diet and returned to normal levels with a regular diet. The enzyme output could be increased slightly by increasing the amount of the elemental diet. These data provide evidence that chemically defined diets may be malabsorbed. It supports the previously reported observation that elemental diets have increased calorie requirements.

5429 AN IN VITRO EVALUATION OF POSSIBLE CHOLINERGIC AND ADRENERGIC RECEPTORS AFFECTING PANCREATIC AMYLASE SECRETION. (Eng.) Williams, J. A. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *Proc. Soc. Exp. Biol. Med.* 150(2): 513-516; 1975.

The possible existence of nicotinic or adrenergic receptors affecting pancreatic amylase release was investigated *in vitro* in pancreas tissue from White Swiss mice, and the secretory response to commonly used cholinergic analogs was compared in the same preparations. Acetylcholine, carbamylcholine, and methylcholine (acetyl-ß-methylcholine) all induced amylase release in a concentration-dependent manner, with a peak response between 3×10^{-7} M and 3×10^{-6} M; there was a much smaller response at higher concentrations. Bethanechol (carbamyl-ß-methylcholine) also induced amylase release, but at approximately 10-30 times the concentration for other agents. Nicotine (3×10^{-5} M), L-norepinephrine (10^{-4} M), and L-isoproterenol (10^{-4} M) had no effect on bethanechol (3×10^{-5} M)-stimulated or -unstimulated amylase release. The mean level of amylase release in response to 5×10^{-7} M acetylcholine (1.51 U/mg/30 min) was almost completely abolished by 3×10^{-6} M atropine (0.48 U amylase released/mg/30 min), while 10^{-4} M hexamethonium and 3×10^{-5} M D-tubocurarine were ineffective. The results confirm the muscarinic nature of the cholinergic receptor mediating amylase release, while no evidence to support a role for nicotinic or adrenergic receptors has been found. The previously reported ability of catecholamines to inhibit enzyme secretion *in vivo*, but not *in vitro* in these experiments, must be due to a change in pancreatic blood flow rather than to a direct effect on the pancreatic acinar cell.

5430 PANCREATIC SECRETION IN RESPONSE TO AN ELEMENTAL DIET AND INTRAVENOUS HYPERALIMENTATION. (Eng.) Kelly, G. A.; Nahrwold, D. L. (Coll. Medicine, Pennsylvania State Univ., Hershey, PA). *Surg. Gynecol. Obstet.* 143(1):87-91; 1976.

Because reports concerning the effects of elemental diets on pancreatic exocrine function have been conflicting, pancreatic responses to the intraduodenal administration of an elemental diet (Vivonex) were compared with responses to p.o. administration of the same mixture in dogs. The pancreatic responses to the elemental diet were compared with the responses to an i.v.-administered amino acid synthetic hyperalimentation solution. The mean volume of pancreatic juice stimulated by intraduodenal infusion in Vivonex (2.0 ml/15 min, 90 min) was not significantly different from that produced by the infusion of saline (1.9 ml/15 min). When the dogs were fed 90 ml of the mixture, however, the mean volume of pancreatic flow increased significantly ($p<0.05$) from a control (saline) level of 1.9 ml/15 min to 7.1 ml/15 min. When the diet was infused intraduodenally, the protein concentration was significantly increased (110 mg/ml), as was the total protein output (213 mg/15 min), over control values (82 mg/ml and 153 mg/15 min, resp.). Because of the relatively greater production of free water, a significant decrease in protein concentration (47 mg/ml) occurred when the diet was given p.o., but the total protein output (242 mg/ml) was increased. Both intraduodenal and p.o. administration caused significant increases in the bicarbonate concentration (25 and 60 µEq/ml, resp.) and bicarbonate output (49 and 461 µEq/15 min, resp.) in comparison with controls (14 µEq/ml and 29 µEq/15 min). The i.v.-administered hyperalimentation solution (1 or 2 ml/kg/hr) produced small but significant increase in the mean volume of pancreatic juice (2.4 ml/15 min), in comparison to controls (1.8 ml/15 min). There were small increases in mean protein concentration, protein output, bicarbonate concentration, and bicarbonate output at both rates of infusion. The results suggest that of the methods currently available for providing adequate nutrition, i.v. hyperalimentation has the least effect on pancreatic exocrine function. Although it is not possible to avoid significant stimulation to pancreatic secretion with this elemental diet, intraduodenal administration prevents the large output of water and electrolytes seen with p.o. administration.

5431 DIRECT EVIDENCE THAT PROTEIN SYNTHESIS CAN BE DECREASED IN PANCREAS FOLLOWING IN VIVO HORMONAL STIMULATION [Abstract]. (Eng.) Mongeau, R.; Dagorn, J. C.; Morisset, J. (GI Res. Unit, Sherbrooke Univ., Sherbrooke, P.Q. J1K 2R1, Canada). *Digestion* 13(3):182; 1975.

5432 IMMUNOHISTOLOGICAL STUDY OF HUMAN PANCREAS: LOCALIZATION OF NONENZYMATIC PROTEINS [Abstract]. (Eng.) Colomb, E.; Figarella, C.; Sarles, H. (INSERM U 31, 46, chemin de la Gaye, F-13009 Marseille, France). *Digestion* 13(3): 165-166; 1975.

5433 CONTROL OF EXOCRINE PANCREATIC SECRETION CHANGES INDUCED BY INGESTION OF A MEAL. STUDIES IN PURE HUMAN PANCREATIC JUICE [Abstract].

(Eng.) Ribera, M. T.; Leitao, C. N. (Hosp., Santa Cruz y San Pablo, Barcelona, Spain). *Biol. Gastroenterol. (Paris)* 9(1):59; 1976.

5434 INFLUENCE OF CHRONIC APPLICATION OF CHOLECYSTOKININ-PANCREOZYMIN AND SECRETIN ON STIMULATED PANCREATIC ENZYME SECRETION [Abstract]. (Eng.) Folsch, U. R.; Wormsley, K. G. (Dept. Medicine, Univ. Gottingen, W. Germany). *Biol. Gastroenterol. (Paris)* 9(1): 57-58; 1976.

5435 EFFECT OF LIPIDS ON INSULIN, GROWTH HORMONE AND EXOCRINE PANCREATIC SECRETION IN MAN. (Eng.) Raptis, S.; Dollinger, H. C.; von Berger, L.; Kissing, J.; Schroder, K. E.; Klor, U.; Pfeiffer, E. F. (Medizinische Klinik Universitat Ulm, Steinhovelstrasse 9, D-7900 Ulm, W. Germany). *Eur. J. Clin. Invest.* 5(6):521-526; 1975.

5436 INHIBITION OF SECRETORY PROCESS IN RAT EXOCRINE PANCREAS BY MICROTUBULE INHIBITORS [Abstract]. (Eng.) Kern, H. F.; Seybold, J.; Bieger, W. (Dept. Anatomy, Univ. Heidelberg, Heidelberg, W. Germany). *Digestion* 13(1/2):113-114; 1975.

5437 FUNCTIONAL ADAPTATION OF RAT EXOCRINE PANCREAS TO PROLONGED STIMULATION BY CAERULEIN IN VIVO. [Abstract]. (Eng.) Kern, H. F.; Bieger, W. (Dept. Anatomy, Univ. Heidelberg, Heidelberg, W. Germany). *Digestion* 13(1/2):113; 1975.

5438 BLOCKADE OF ZYMOGEN GRANULE RELEASE BY 5-FLUOROURACIL--AN UNUSUAL INHIBITION OF PANCREATIC SECRETION [Abstract]. (Eng.) Levin, J. (Dept. Physiology, Univ. Sheffield, Yorks, England). *Digestion* 13(1/2):114-115; 1975.

5439 EFFECTS OF INTRADUODENAL CALCIUM INFUSION ON CANINE EXOCRINE PANCREATIC SECRETION [Abstract]. (Eng.) Tiscornia, O. M.; Levesque, D.; Voirol, M.; Bretholz, A.; Sarles, H. (INSERM U-31, Marseille, France). *Digestion* 13(1/2):126; 1975.

See also, 5449, 5492, 5494, 5506.

SECRETION AND METABOLISM

Hepatobiliary Tract

5440 CIRCADIAN RHYTHM OF BILE SECRETION IN THE RAT. (Eng.) Balabaud, C.; Noel, M.; Beraud, C.; Dangoumau, J. (Laboratoire de Pharmacologie, Universite de Bordeaux II, 3, place de la Victoire, F-33000 Bordeaux, France). *Experientia* 31(11):1299-1301; 1975.

Experiments were carried out to determine whether bile flow in the rat follows a diurnal rhythm. Thirty-three male Wistar rats were housed for 8 days before the study in a dark room. The room was lighted between 0800 and 2000 hr, and the rats were fed from 2000 to 2400 hr. The rats were randomized into three groups of 11 each: group I was studied at 0800 hr, group II at 1700 hr, and group III at 2400 hr. The mean basal bile flow at 1700 hr (7.68 µl/min/100 g) was significantly lower than that at 0800 hr (9.49 µl/min/100 g, $p<0.01$) or at 2400 hr (8.95 µl/min/100 g, $p<0.01$). The estimated bile acid independent flow (BAIF), i.e., the intercept of the regression line for bile flow versus bile acid excretion rate with the vertical axis, expressed in µl/min/100 g body weight in group II (5.84), was significantly lower than that in group I (7.25 µl/min/100 g, $p<0.05$) or in group III (7.52 µl/min/100 g, $p<0.05$). Expressed in µl/min/g liver, the estimated BAIF was not significantly different in the three groups. The 22% decrease in BAIF between 2400 hr and 1700 hr paralleled a 19% decrease in liver weight. It is concluded that bile flow in the rat follows a diurnal rhythm, with a decrease at the end of the light period, far from the feeding period. The decrease is due to a reduction of the BAIF. Parameters such as food, light, and time schedule must be carefully checked in experiments concerning bile flow.

5441 THE CONSEQUENCES OF LIPID PEROXIDATION IN ISOLATED HEPATOCYTES. (Eng.) Hogberg, J.; Moldeus, P.; Arborgh, B.; O'Brien, P. J.; Orrenius, S. (Dept. Forensic Medicine, Karolinska Institutet, Solnavagen 1, S-10401 Stockholm 60, Sweden). *Eur. J. Biochem.* 59(2):457-462; 1975.

The biochemical and morphological effects of lipid peroxidation initiated by the addition of either ADP-complexed Fe^{3-} (50 mM ADP + 1.87 mM $FeCl_3$) or cumene hydroperoxide (30 mM) to isolated rat hepatocytes were investigated. To test cell membrane permeability, pyruvate (0.67 mM), and NADH (0.1 mM) were added to the cell medium, and the absorbance at 340 nm was measured. The oxidation of NADH in the fresh cell suspension was 13% of that achieved after lysis of the cells with 0.25% sodium deoxycholate; a control incubation by shaking the cells for 20 min at 37 C increased the rate of NADH oxidation to about 33% of the deoxycholate-stimulated activity. The latency of lactate dehydrogenase was further decreased to 38, 49, and 67% by the addition of 19, 44, and 187 µM ADP-complexed Fe, resp., and to 44, 49, 69, and 100% by the addition of 75, 150, 300, and 750 μM cumene hydroperoxide, resp. Alprenolol metabolism, which is a cytochrome P-450-dependent reaction, was decreased from a control level of 11.1 nmol x 15 min^{-1} x (10^{6} cells)$^{-1}$ to 10.7, 9.0, 5.9, 8.7, 7.6, and 0.9 after 20 min of incubation with 47, 187, and 370 μM ADP-complexed Fe or 150, 300, or 750 μM cumene hydroperoxide, resp. The inactivation was related to the amount of malonaldehyde formed with both inducers. The cumene hydroperoxide-induced lipid peroxidation was associated with a decomposition of cytochrome P-450, as revealed by the carbon monoxide difference spectra. The iron-induced reaction did not cause any decrease in the level of cytochrome P-450, but lower levels of lipid peroxidation were involved. The inhibition of microsomal oxidative drug metabolism was correlated with the release and subsequent inactivation of NADPH-cytochrome c reductase, while cytochrome P-450 destruction occurred only in the presence of high concentrations of cumene hydroperoxide (150 μM), which were associated with extensive malonaldehyde formation. There were also marked ultrastructural alterations in the hepatocytes (at 600 μM cumene hydroperoxide), which were not apparent after incubation in the presence of iron (≤187 μM Fe^{3+}). The changes included irregularly shaped endoplasmic reticulum with distended cisternae and dilated Golgi apparatuses, extracted cell sap, and disrupted plasma membranes. It is concluded that the isolated liver cell system provides a valuable tool for the study of lipid peroxidation and its pathological implications.

5442 AZO DYES AND HEPATIC VITAMIN A RESERVES.

(Fre.) Truhaut, R. (Centre de Recherches Toxicologiques, Universite Rene Descartes, 4, Avenue de l'Observatoire, F-75006 Paris, France). *Arzneim. Forsch.* 25(10):1594-1596; 1975.

To test the effects of Amaranth and Sunset Yellow FCF on vitamin A stored in the rat liver, 105 female Wistar rats, born of mothers fed 800 IU vitamin A per kg of food, were fed a vitamin A-deficient diet. Twelve animals were sacrificed after 10 days. Twelve animals received 30 g vitamin A per day for 10 days. The remaining animals were divided into 9 groups and received either 1,200, 3,000, 10,000, or 20,000 mg Amaranth or Sunset Yellow FCF per kg of food, in addition to 30 g per day of vitamin A for 10 days. Neither azo dye at any concentration had an effect on the growth, food consumption index, or percentage of vitamin A stored in the liver of young rats.

5443 EXPERIMENTAL STUDIES OF THE BILIARY ELIMINATION OF CONJUGATED BSP BY THE LIVER, IN VIVO, AND IN THE ISOLATED AND PERFUSED LIVER.

(Fre.) Catau, G.; Catau, R.; Besson, S.; Galipienso, A. M. (Faculte des Sciences pharmaceutiques et Biologiques, 7, rue Albert Lebrun, 54001 Nancy, France). *C.R. Soc. Biol. (Paris)* 169(3):637-640; 1975.

The biliary excretion of conjugated BSP by the liver *in vivo* and by isolated and perfused liver was studied to determine if the technique of perfusion affected the liver's capacity to metabolize BSP. The inhibitory effect of benziodarone on conjugation of BSP with glutathione was also studied. After injection of 15 mg/kg BSP, the percentage of BSP eliminated in the conjugated form was similar in the intact rat and in the isolated and perfused rat liver, (80-85% in the first hr and 90-95% for the last fractions eliminated). Carbon tetrachloride, 1 mg/kg, i.p., or amitriptyline, 50 or 100 mg, i.m., administered 24 hr before BSP injection, had no effect on level of conjugation. When the intact rat was pretreated with benziodarone, 50 mg/kg, i.p., either 1 hr before a single i.v. injection of BSP or before a continuous, slow perfusion of BSP, level of conjugation remained the same during the first hr the elimination of BSP was measured. However, during the second hr level of glutathione-injected BSP fell to 60-70% after a single injection of BSP and to 25% after end of perfusion of BSP. A similar decrease in level of conjugated BSP was observed when 100 μM of benziodarone was added to the perfusion fluid used in the *in vitro* studies of the isolated rat liver. Concentration of BSP in the perfusion fluid was 1 μM and of glutathione, 93 μM. It is hypothesized that benziodarone competes with BSP for glutathione or blocks the -SH group in cysteine, necessary for formation of the BSP-glutathione conjugate.

5444 COMPARATIVE STUDIES ON THE EFFECT OF CHOLESTEROL FEEDING ON BILIARY COMPOSITION.

(Eng.) Ho, K.-J. (Univ. Alabama Birmingham, Medical Center, Birmingham, AL 35294). *Am. J. Clin. Nutr.* 29(7):698-704; 1976.

The effect of cholesterol feeding (1.2 or 2% cholesterol by weight) on the biliary composition in six species (chickens, rabbits, rats, hamsters, ground squirrels, and prairie dogs) and their susceptibility to cholesterol cholelithiasis were investigated. The gallbladder or hepatic bile from all species had a uniformly low cholesterol content, far below its maximum solubility. The relative concentration of bile acid was higher in chickens and rabbits, and the relative concentration of phospholipid was higher in the other species. The cholesterol content remained constant in all six species (0.7-3%). Cholesterol feeding produced extreme hypercholesteremia in rabbits, ground squirrels, and prairie dogs, moderate hypercholesteremia in chickens and hamsters, and a slight elevation of serum cholesterol in rats. All animals developed cholesterol fatty liver. The gallbladder bile of prairie dogs reached the boundary of metastable supersaturation of cholesterol and subsequently developed cholesterol crystals and gallstones. A circadian change in the relative concentration of bile acid, cholesterol, and phospholipid in the hepatic bile of rats with chronic biliary drainage was observed as a consequence of cholesterol feeding. Cholesterol feeding selectively increased both the relative and absolute biliary cholesterol contents in hamsters and ground squirrels. The relative concentration of biliary cholesterol was increased in hens and roosters fed a cholesterol diet, but not in rats and rabbits. The reasons for species differences in response to cholesterol feeding and susceptibility to gallstone formation are not known. There may be some differences in the basic mechanisms involved in the biliary excretion of excessive hepatic cholesterol between species.

5445 THE EFFECT OF (+)-CATECHIN ON THE ALTERATIONS OF COENZYME A, CARNITINE AND THEIR FATTY ACID ESTERS INDUCED BY ACUTE ETHANOL APPLICATION IN THE RAT LIVER. (Eng.) Wolfert, W.; Goebell, H. *In: New Trends in the Therapy of Liver Diseases. Proceedings of the International Symposium on New Trends in the Therapy of Liver Diseases, Tirrenia, June 6-7, 1974.* (Basel: Karger):pp. 164-168; 1975.

The possible effects of (+)-catechin on the alterations in fatty acid metabolism that occur in acute ethanol intoxication were investigated in rats that received 35% ethanol (5 g/kg) by stomach tube. The mean amounts of free coenzyme A (CoA), acetyl-CoA, acyl-CoA, free carnitine, acetyl-carnitine, and acyl-carnitine (197, 51, 122, 66, 96, and 115 nmol/g fresh weight, resp.) were increased after ethanol administration, in comparison with controls receiving isocaloric glucose (107, 31, 60, 31, 42, and 77 nmol/g, resp.). (+)-Catechin (200 mg/kg), given intragastrically during ethanol administration and also 1 hr later, fully reversed the increased levels of free CoA, acetyl-CoA, acyl-CoA, free carnitine, and acyl-carnitine, the values being 98, 34, 60, 24, and 83 nmol/g, resp. Doubling the dose of (+)-catechin had no further effect on the levels of CoA or its derivatives, although it did normalize the level of acetyl-carnitine (51 nmol/g) and further decreased the level of acyl-carnitine (54 nmol/g). After ethanol administration, the hepatic acetoacetate content dropped significantly from a mean control value (controls received saline) of 83 nmol/g to 16 nmol/g; the level of β-hydroxybutyrate increased from a control level of 139 nmol/g to 310 nmol/g. (+)-Catechin (200 mg/kg) partly reversed the effect of ethanol, the difference being significant for acetoacetate (23 nmol/g, $p<0.05$), but not significant for β-hydroxybutyrate (255 nmol/g). The ratio of β-hydroxybutyrate to acetoacetate was 1.7 for controls, 19 for ethanol-treated rats, and 9 for ethanol-plus-(+)-catechin-treated rats. The mean concentration of free fatty acids was significantly increased in ethanol-treated rats (1,343 μval/l), in comparison with controls treated with glucose (734 μval/l), although (+)-catechin had no influence on this elevation. The results of this study correspond to those previously published.

5446 STABILIZATION OF RAT-LIVER LYSOSOMES BY (+)-CYANIDANOL-3 IN VIVO. (Eng.) Niebes, P.; Ponard, G. *In: New Trends in the Therapy of Liver Diseases. Proceedings of the International Symposium on New Trends in the Therapy of Liver Diseases, Tirrenia, June 6-7, 1974.* (Basel: Karger): pp. 128-139; 1975.

The *in vivo* effect of (+)-cyanidanol-3 on the lysosomal membrane was investigated in the livers of female Wistar rats. The discharge of three lysosomal enzymes, N-acetyl-β-glucosaminidase, β-glucuronidase, and acid phosphatase was measured in control rats and in animals on the following regimens: (+)-cyanidanol-3 (200 mg/kg/day, s.c.) for 12 days; D-galactosamine HCl (200 mg/kg/day, s.c.) for 7 days; D-galactosamine HCl for 7 days and (+)-cyanidanol-3 for 6 days; 10% ethanol for 4 weeks followed by 20% ethanol for 6 weeks; 10% ethanol for 4 weeks, 20% ethanol for 6 weeks, and (+)-cyanidanol-3 (100 mg/kg/day) for the last 20 days. D-galactosamine provoked a fragility in the lysosomes and increased the discharge of the enzymes by about 30%, while (+)-cyanidanol-3 reduced the fragility and diminished the discharge of enzymes by 15%. Ethanol provoked an abnormal fragility in the hepatic lysosomes, with an increased discharge of the three enzymes by 20%, compared to controls; (+)-cyanidanol-3 counteracted the effects. At a dose of 1 mg/ml, (+)-cyanidanol-3 had no effect on the discharge of enzymes or on their stability *in vitro*. The results show that (+)-cyanidanol-3 exercises a protective action on hepatic cells.

5447 EFFECT OF PHENOBARBITAL ON LIPID PEROXIDATION IN THE LIVER. (Eng.) Hahn, H. K. J.; Tuma, D. J.; Barak, A. J.; Sorrell, M. F. (Veterans Admin. Hosp., Omaha, NB 68105). *Biochem. Pharmacol.* 25(7):769-772; 1976.

Studies were carried out in male Sprague-Dawley rats to determine whether phenobarbital (PB) increases lipid peroxidation in the liver and to determine whether peroxidation is involved in the formation of fatty liver. The effect of *N,N'*-diphenyl-*p*-phenylenediamine (DPPD) on the inductive effects of PB was also studied. PB (50 mg/kg/12 hr, 5 days, i.p.) administration increased liver weight, NADPH cytochrome *c* reductase activity, and the content of cytochrome P-450. When DPPD (60 mg/100 g, i.p.) was given at intervals of 72 and 24 hr prior to PB and at 24 hr before sacrifice, the inductive effects of PB in the liver were not affected; there was, however, a decrease in body weight. PB caused a marked increase in diene conjugation when administered either with saline (0.449 optical density/mg phospholipid/ml) or with mineral oil (0.430 optical density/mg/ml), in comparison with controls that received saline (0.314 optical density/mg/ml) or mineral oil (0.295 optical density/mg/ml). DPPD did not alter the UV absorption of the microsomal lipids in controls, although it was effective in suppressing the increased lipid peroxidation resulting from PB treatment. The UV spectra for microsomal lipids and the different spectra between the mineral oil control and PB-treated animals showed that the increase in the diene conjugation peak of the microsomal lipids of the PB-treated rats ranged from 232 to 235 nm throughout the experiment. PB administration caused a three- to fivefold increase in hepatic triglyceride levels, compared to both the saline and mineral oil controls. DPPD administration resulted in a 60-70% inhibition of triglyceride accumulation in the rats that received PB. PB treatment caused a fivefold increase in malonic dialdehyde production (as measured by the thiobarbituric acid method) over controls (0.594 μg/mg protein versus 0.106 μg/mg protein). The results show that PB enhances hepatic lipid peroxidation and causes an accumulation of triglyceride in the liver; the latter confirms previous studies, which indicated that PB induces fatty liver in rats. The fact that DPPD was effective in preventing the increase in lipid peroxidation, as well as reducing the triglyceride accumulation resulting from PB treatment, suggests that the peroxidative process may play a role in the PB-induced fatty changes in the liver.

5448 MECHANISM OF ACTION OF PHENOBARBITAL ON BILIARY SECRETION.

(Fre.) Pavel, I.; Costiner, E.; Mitrache, L. (Institut d'Endocrinologie C. I. Parhon, Intrarea Caragiale nr. 6, Bucharest, Sect. II, 201, Rumania). *Ann. Gastroenterol. Hepatol.* 11(5):365-370; 1975.

The *in vitro* effects of phenobarbital on biliary secretion were studied in the rat. Isolated rat livers were perfused with 2 mg phenobarbital dissolved in 19 ml Ringer's solution. The perfusion lasted 2 hr. In controls (no phenobarbital) bile secretion occurred 25 min after the beginning of the perfusion, while in the treated animals, secretion began 2-3 min after the perfusion started. The volume of secretion increased by 34% and the concentration of bilirubin in the bile decreased by 41% in phenobarbital treated rats. It is hypothesized that the opening of the hepatic intercellular junctions (zonulae occludente) is responsible for the phenomenon.

5449 PROTECTIVE EFFECT OF SELENIUM ON CERTAIN HEPATOTOXIC AND PANCREOTOXIC MANIFESTATIONS OF SUBACUTE CADMIUM ADMINISTRATION.

(Eng.) Merali, Z.; Singhal, R. L. (Faculty Medicine, Univ. Ottawa, Ottawa, Ontario KIN 9A9, Canada). *J. Pharmacol. Exp. Ther.* 195(1):58-66; 1975.

The effects of subacute exposure to cadmium and selenium on hepatic carbohydrate metabolism and pancreatic function were assessed, and the protective effects of selenium on cadmium-induced biochemical and functional changes in male Sprague-Dawley rats were investigated. In subacute studies, rats were given either cadmium chloride (2 mg/kg/day, s.c.) or selenium dioxide (2 mg/kg/day, s.c.) in divided doses 12 hr apart for 7 days. The same doses were administered simultaneously in separate solutions in the protective studies. Cadmium alone significantly ($p<0.05$) elevated the levels of hepatic pyruvate carboxylase, phosphoenolpyruvate carboxykinase, fructose 1,6-diphosphatase, and glucose 6-phosphatase over controls, while selenium produced no significant change in enzyme levels. The simultaneous administration of cadmium and selenium significantly ($p<0.05$) lowered the activities of the glucogenic enzymes over those with cadmium alone. Similarly, cadmium caused a marked increase in the concentration of endogenous cyclic AMP ($p<0.05$), but selenium's values remained within the range of controls. The combined dose produced an elevation in cyclic AMP, which was similar to that for cadmium alone ($p<0.05$). Selenium pretreatment failed to significantly alter the resting blood glucose level or the normal response to a glucose load (2.0 g/kg, i.p.). Rats pretreated with cadmium displayed hyperglycemia and reduced glucose tolerance. The simultaneous administration of cadmium and selenium also caused a rise in resting blood glucose, but the increase was lower than that for cadmium alone. Prior to glucose administration, the serum immunoreactive insulin (IRI) concentration in selenium-treated rats remained within normal values, while that in cadmium-treated rats was markedly depressed. The glucose load produced a normal rise in the serum IRI level in selenium-treated rats, but a statistically significant depression was seen in rats given cadmium. In animals receiving both compounds, the glucose load produced greater increases in serum IRI concentrations than in those given cadmium alone. Cadmium pretreatment resulted in markedly reduced insulinogenic indices, suggesting that cadmium produces a decrease in pancreatic secretory activity. Selenium administration concurrent with that of cadmium appears to mitigate, in varying degrees, several cadmium-induced metabolic and functional changes.

5450 INFLUENCE OF A LONG OR MEDIUM CHAIN TRIGLYCERIDE DIET ON INTERMEDIARY HEPATIC METABOLISM OF THE RAT.

(Eng.) Bach, A.; Phan, T.; Metais, P. (Laboratoire de la Clinique medicale A, Hopital Civil, F-67000, Strasbourg, France). *Nutr. Metab.* 19(1/2):103-110; 1975.

To study the influence of the metabolism of medium chain triglycerides (MCT) on some aspects of the intermediary metabolism of the liver, two groups of male Wistar rats received, *ad libitum*, diets containing either MCT or long chain triglycerides (LCT), constituting 20% of the diet, for 4-5 weeks. The results were compared with those of a third group of rats fed a low-fat control diet, which contained 2.5% LCT. No difference in weight increase was found between the rats on the LCT and MCT diets. Total lipids and cholesterol concentrations in the plasma were also the same with both diets. The two high-fat diets caused an increase in the mean levels of hepatic acetyl coenzyme A (control, 27 nmol/g liver; LCT, 119 nmol/g; MCT, 111 nmol/g), citrate (control, 175 nmol/g; LCT, 341 nmol/g; MCT, 317 nmol/g), malate (control, 376 nmol/g; LCT, 580 nmol/g; MCT, 971 nmol/g), acetoacetate (control, 55 nmol/g; LCT, 101 nmol/g; MCT, 111 nmol/g, and β-hydroxybutyrate plus acetoacetate (control, 218 nmol/g; LCT, 277 nmol/g; MCT, 303 nmol/g). The concentration of acetoacetate plus β-hydroxybutyrate decreased in the blood from a control level of 182 nmol/ml to 134 nmol/ml in the animals fed LCT and to 111 nmol/ml in those fed MCT. No ketonuria occurred. In the rats fed MCT, the mean hepatic levels of ATP, AMP, and inorganic phosphate (3462, 1840, and 3791 nmol/g, resp.) were higher than those in the rats fed LCT (3133, 1453, and 2912 nmol/g, resp.). The levels of these substances were increased in both groups compared with the controls (2432, 680, and 893 nmol/g, resp.). The blood lactate and pyruvate concentrations in the LCT rats (458 and 22 nmol/ml, resp.) were significantly lower than those in controls (887 nmol/ml and 72 nmol/ml, resp.). Hepatic and blood lactate concentrations in MCT rats were at least equal to or slightly higher (not significantly) than those of controls. Hepatic glucose and glycogen and blood glucose concentrations were higher in rats fed the high fat diets. Replacing a low-fat diet with a high-fat one causes modifications of intermediary metabolism in the blood and liver, but there are fewer differences between LCT and MCT diets than might be expected.

5451 EFFECT OF PORTACAVAL ANASTOMOSIS ON THE ACTIVITIES OF HEPATIC ENZYMES RELATED TO CHOLESTEROL AND BILE ACID METABOLISM IN RATS.

(Eng.) Balasubramaniam, S.; Press, C. M.; Mitropoulos, K. A.; Magide, A. A.; Myant, N. B. (Medical Res. Council Lipid Metabolism Unit, Hammersmith Hosp., London, W12 OHS, United Kingdom). *Biochim. Biophys. Acta* 441(2):308-315; 1976.

The effect of portacaval anastomosis (PCA) on the activities of hepatic enzyme systems related to cholesterol metabolism was studied in inbred male Wistar rats. The rats were either given PCA and fed ad libitum, sham operated and pair-fed with the first group, or sham operated and fed ad libitum. Subcellular fractions from the livers were analyzed for enzyme activities, and content of bile acids, cholesterol, and protein. Total body weight, the liver weight, and the liver/body weight ratio were all significantly lower in the PCA-treated rats (208 ± 8 g, 3.8 ± 0.6 g, and 0.019 ± .004, resp.) than in the controls fed ad libitum (303 ± 11 g, 10.3 ± 0.3 g, and 0.034 ± 0.001, resp.). The total body weight of the PCA-treated rats was not significantly different from that of pair-fed controls, but their liver weight was half that of pair-fed controls. Cannulation of the bile duct reduced the body weight of both PCA and control rats fed ad libitum, but did not affect the liver/body weight ratio in either group. Total liver cholesterol was significantly lower in the PCA-treated rats and pair-fed controls (1.66 ± 0.1 mg/g and 1.20 ± 0.1 mg/g, resp.), than in controls fed ad libitum (1.98 ± 0.1 mg/g), but the liver microsomal concentration was significantly higher in the PCA-treated rats (44.9 ± 2.9) than in controls fed ad libitum (39.7 ± 4.1 mmol/mg protein). In the three groups of rats, the activities of hydroxymethylglutaryl-CoA reductase, cholesterol-7-alpha-hydroxylase, and tyrosine transaminase exhibited diurnal rhythm, each activity exhibiting between 1300 and 0100 hr. All three activities were significantly higher in the PCA-treated rats than in either set of controls at both times. Ethylmorphine demethylase activity was significantly lower in the PCA-treated rats than in controls. The amount of cytochrome P-450 per mg of microsomal protein was significantly lower in the PCA rats than in the pair-fed controls. In a separate group of 20 rats, PCA was administered to 10, and 10 were sham operated. The bile duct was cannulated in five rats from each group, the other five being sham operated for cannulation. Bile was collected for 48 hr, and the livers were assayed. In the controls fed ad libitum, the activity of cholesterol-7-alpha-hydroxylase was higher in cannulated rats (44.0 ± 3.9 pmol/min/mg protein) than in those with normal enterohepatic circulation (29.4 ± 3.2 pmol/min/mg protein). In PCA-treated rats, the enzyme activity was the same in cannulated (45.5 ± 3.9 pmol/min/mg protein) and noncannulated rats (43.5 ± 2.1 pmol/min/mg protein), and higher than in control rats with normal enterohepatic circulation (29.4 ± 3.2 pmol/min/mg protein). The bile acid pools per 100 g body weight were similar in the PCA and control rats. One day after cannulation, bile acid excretion assumed a diurnal rhythm in PCA and control rats, with a maximum in the dark period. Total bile acids secreted during the second 24 hr was significantly lower in PCA-treated rats than in controls fed ad libitum, but liver weight accounted for the difference. The results suggest that PCA-treated rat livers compensate partially for loss of mass by an increased capacity for cholesterol synthesis per unit mass, and that the effects of bile fistula and PCA on cholesterol-7-alpha-hydroxylase activity are mediated through a common mechanism or that the enzyme is fully depressed by PCA.

5452 SERUM GLYCOPROTEIN SYNTHESIS AFTER PARTIAL HEPATECTOMY IN THE RAT.

(Eng.) Serafini-Cessi, F. (Istituto di Patologia Generale, Via S. Giacomo 14, 40126 Bologna, Italy). *Biochem. J.* 158(1):153-155; 1976.

Experiments were designed to measure the *in vivo* incorporation of ^{14}C-glucosamine into serum proteins at various times after partial hepatectomy in Wistar rats. The specific radioactivity of amino sugars in serum proteins was compared with that of hexosamines bound to liver microsomal fractions. A rapid method of measuring the specific radioactivity of D-[1-^{14}C]-glucosamine is described; the method is based on the separation of a volatile chromogen. The rats received a single injection of D-[1-^{14}C]-glucosamine (10 μCi, i.p.). A decrease in the incorporation of ^{14}C-glucosamine into glycoproteins appeared in the regenerating livers. The maximum increase occurred 24 hr after the operation. The specific radioactivity of hexosamines was 133-692 counts/min/μmol between 0.75 and 24 hr after injection in the test animals and 277-1466 counts/min/μmol in sham-operated animals. After 72 hr, the rates of incorporation were similar in the two groups of animals. In regenerating livers 24 hr after operation, the specific radioactivity of hexosamines bound to liver microsomal fractions was halved in comparison with the sham-operated animals. The values of glucosamine incorporation in partially hepatectomized rats increased from hepatectomy, and after 72 hr, the specific radioactivity reached the same value as in the sham-operated animals. These results demonstrate that a day after partial hepatectomy, the synthesis of glycoproteins that are mainly extruded into the bloodstream is significantly decreased.

5453 THE TRANSPORT MAXIMUM CONCEPT IN INTRAVENOUS CHOLANGIOGRAPHY [Abstract].

(Eng.) Whitney, B. (Hammersmith Hosp., Du

Cane Road, London, W.11, England). *Br. J. Radiol.* 48(575):944-945; 1975.

5454 LEVELS OF IOGLYCAMATE (BILIGRAM) IN THE BILE OF THE RHESUS MONKEY FOLLOWING INTRAVENOUS INFUSION AT DIFFERENT DOSE-RATES. (Eng.) Whitney, B. P.; Bell, C. D. (St. Mary's Hosp., Milton Rd., Portsmouth, Hants, England). *Br. J. Radiol.* 49(578):118-122; 1976.

5455 METABOLISM OF VOLATILE ANESTHETICS IN HEPATIC MICROSOMES. (Jpn.) Takahashi, S. (Dept. Anesthesiology, Kyushu Univ., Fukuoka, Japan). *Fukuoka Acta Med.* 66(4):271-279; 1975.

5456 THE EFFECT OF BILE ACID POOL RECYCLING ON BILIARY LIPID COMPOSITION IN THE BABOON [Abstract]. (Eng.) Hawkins, J. W.; Redinger, R. N. (Univ. Hosp., London, Ontario, Canada) *Clin. Res.* 23(5):577A; 1975.

5457 FORMATION OF BILE SALT GLUCURONIDES IN THE ISOLATED PERFUSED BILE DUCT OBSTRUCTED RAT LIVER [Abstract]. (Eng.) Forhling, W.; Liersch, M.; Stiehl, A. (Dept. Medicine, Medizinische Universitatsklinik, Univ. Heidelberg, Heidelberg, Germany). *Digestion* 12(4/6):303-304; 1975.

5458 QUANTITATIVE EVALUATION OF HEPATIC GLYCOGEN BY MEANS OF HISTOPHOTOMETRY ON SEMITHIN SECTIONS OF EPON-EMBEDDED TISSUE. (Fre.) Vernier, J.-M.; Sire, M.-F. (Laboratorie de Biologie-Vertebres, Universite Paris-Sud, 94105 Orsay, France). *Acta Histochem. Cytochem.* 9(1):1-11; 1976.

5459 STUDY OF THE LIPID COMPOSITION OF THE NORMAL LIVER BY THIN-LAYER CHROMATOGRAPHY. (Spa.) Masdeu, S.; Romero, R.; Ras, M. R.; Frison, J. C.; Rubies-Prat, J. (Ciudad Sanitaria de la Seguridad Social, Universidad Autonoma, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(3):299-308; 1976.

5460 HEPATIC UPTAKE AND BILIARY EXCRETION OF UNCONJUGATED AND CONJUGATED SULFOBROMOPHTHALEIN IN THE RAT UNDER THE INFLUENCE OF CHOLIC ACID AND DEHYDROCHOLIC ACID [Abstract]. (Eng.) Czok, G.; Schulze, P.-J.; Meyer, H. (Pharmakologisches Institut der Universitat Hamburg, Hamburg, Germany). *Digestion* 12(4/6):275; 1975.

5461 THE RELATION BETWEEN CHANGES IN THE PHAGOCYTIC ACTIVITY OF THE RETICULOENDOTHELIAL SYSTEM AND THE ALTERATIONS IN PROTEIN AND NUCLEIC ACID CONTENT OF THE RAT LIVER (Fre.) Pipy, B.; Gaillard, D.; Derache, R. (INSERM U-87, Universite Paul Sabatier, 2 rue Francois-Magendie, 31400 Toulouse, France). *J. Physiol. (Paris)* 70(3):287-297; 1975.

5462 CHANGES IN MITOTIC ACTIVITY IN RAT LIVER LOBE WITH DIFFERENT TYPES OF INJURY. (Rus.) Petrovitchev, N. N. (First Leningrad Medical Inst., Leningrad, USSR). *Tsitologiia* 17(10):1221-1223; 1975.

5463 HUMORAL IMMUNE REACTIONS ON THE HEPATOCELLULAR PLASMA MEMBRANE IN EXPERIMENTAL CHRONIC ACTIVE HEPATITIS IN RABBITS. (Ger.) Hopf, U.; Meyer zum Buschenfelde, K. H.; Hutteroth, Th. (II. Medizinische Universitats-Klinik, Langenbeckstr. 1, D-6500 Mainz, W. Germany). *Klin. Wochenschr.* 54(12):591-598; 1976.

5464 CLINICOPATHOLOGICAL STUDIES ON THE CORRELATION BETWEEN FUNCTION AND MORPHOLOGY IN DOG LIVERS AFTER TREATMENT WITH CARBON TETRACHLORIDE. (Jpn.) Imagawa, A. (Nara Medical Univ., Nara, Honshu, Japan). *J. Nara Med. Assoc.* 26(1):21-40; 1975.

5465 STUDY OF THE EFFECTS OF GLYCYRRHETINIC ACID AND ITS DERIVATIVES ON Δ^{4}-α- AND 5β-REDUCTASE BY RAT LIVER PREPARATIONS. (Jpn.) Tamura, Y. (2nd Dept. Internal Medicine, Chiba Univ., Chiba, Japan). *Folia Endocrinol. Jpn.* 51(7):589-600; 1975.

5466 EFFECT OF ISCHEMIA ON HEPATIC PARENCHYMAL AND RETICULOENDOTHELIAL FUNCTION IN RATS [Abstract]. (Eng.) Alvarez de la Marina, J. R.; Afifi, F.; Fekete, F. (Hopital Beaujon, Clichy, France). *Digestion* 19(4/6):281-282; 1975.

5467 CHANGES IN VOLUMES OF THE NUCLEUS, CYTOPLASM AND HEPATOCYTE DURING RESTORATION AFTER DIFFERENT KINDS OF LESIONS. (Rus.) Petrovichev, N. N. (Dept. Pathological Anatomy, 1st Leningrad Medical Inst., Leningrad, USSR). *Tsitologiia* 17(12):1429-1431; 1975.

5468 CHANGES OF THE LYMPH IN THE THORACIC DUCT FOLLOWING LIVER ALLOGRAFT IN DOGS. (Ger.) Vosmik, J.; Vucinic, M.; Bartos, V.; Ondracek, Z.; Cermak, S.; Pavlik, F.; Nozickova, M.; Kocinova, M.; Malek, P. (Forschungszentrum fur Organtransplantationen, Institut fur klinische und experimentelle Medizin, Prague, Czechoslovakia). *Z. Exp. Chir.* 8(5):282-287; 1975.

5469 SURGICAL PROBLEMS OF EXPERIMENTAL LIVER TRANSPLANTATION IN PIGS. (Ger.) Koristek, V.; Cerny, J.; Filkuka, J. (II. Chir. Universitatsklinik, J. E. Purkyne-Universitat, Brno, Czechoslovakia). *Z. Exp. Chir.* 8(5):272-287; 1975.

5470 THE ABSORPTIVE-EXCRETORY FUNCTION OF THE ISOLATED PERFUSED DOG LIVER. (Rus.) Rozental, R. L.; Cimermane, G. I.: Krivulis, D. B.; Sandore, A. A.; Sorokin, Yu. A. (Riga Medical Inst., Riga, USSR). *Biull. Eksp. Biol. Med.* 81(4):405-407; 1976.

5471 PERFUSION OF THE LIVER AS A MEANS TO STUDY HEPATOTOXICITY. (Fre.) Vanlerenberghe, J. (Faculte de Medecine de Lille, Place de Verdun, 59045 Lille Cedex, France). *Ann. Gastroenterol. Hepatol.* 12(1):59-63; 1976.

5472 THE INFLUENCE OF AGE ON CHOLESTEROL SATURATION OF BILE [Abstract]. (Eng.) Trash, D. B.; Ross, P. E.; Murison, J.; Bouchier, I. A. D. (Ninewells Hosp., Dundee, Scotland). *Gut* 17(5):394; 1976.

See also, 5421, 5494, 5497, 5506, 5513, 5568, 5617, 5948.

SECRETION AND METABOLISM

Intestine

5473 INTESTINAL MUCOSAL CYCLIC GMP: REGULATION AND RELATION TO ION TRANSPORT. (Eng.) Brasitus, T. A.; Field, M.; Kimberg, D. V. (United States Air Force Maxwell Regional Hosp., Maxwell Air Force Base, AL 36112). *Am. J. Physiol.* 231(1): 275-282; 1976.

Because of the known stimulatory effect of α-adrenergic agonists on cyclic GMP (cGMP) levels in other tissues, the possible role of cGMP in the action of epinephrine on intestinal ion transport was studied in rabbits. Stimulation of α-adrenergic and muscarinic cholinergic receptors with carbachol (50 nmol/ml) in rabbit ileal mucosa *in vitro* produced 5- to 15-fold increases in cGMP concentrations that were maximal within 2 min and gone within 30 min. Cholecystokinin octapeptide (1 μM) and insulin (50 μM) caused similar increases in cGMP. None of these agents affected cAMP. The epinephrine-induced increase in cGMP was blocked by atropine at 100 μM, but not at 1 μM. Epinephrine stimulates active NaCl absorption and decreases short-circuit current (SCC) *in vitro*, the latter effect due to inhibition of HCO_3 secretion. Atropine (100 μM) blocked the NaCl absorption but not the decrease in SCC. *In vitro* additions of several concentrations of cGMP and 8-bromo-cGMP did not decrease SCC or alter Na fluxes. Thus, changes in the cGMP concentration have been directly correlated with changes in the active absorption of NaCl, but a causal relationship has not been proven.

5474 EFFECT OF DIET ON THE CIRCADIAN RHYTHM IN THE DIGESTIVE ENZYMES OF RAT SMALL INTESTINE. (Eng.) Saito, M.; Murakami, E.; Suda, M. (Sch. Medicine, Ehime Univ., Shigenobu, Ehime 791-02, Japan). *J. Nutr. Sci. Vitaminol. (Tokyo)* 22(1);63-65; 1976.

The circadian rhythm observed in the activities of many digestive enzymes may be closely related to the rhythm of food intake and not to the light-dark cycle. The circadian rhythm of the maltase and leucine aminopeptidase activities of the small intestine was examined in male Wistar rats that had been fed either a carbohydrate-free or protein-free diet. The rats were kept under a controlled lighting regime with a dark period from 1800 to 0600 hr. The animals were fed either the carbohydrate-free or protein-free diet from 0900 hr to 1500 hr for 2 weeks. The activities of maltase and leucine aminopeptidase were low during the night and high in the daytime, irrespective of the diet. The leucine aminopeptidase activity was significantly lower in rats fed a protein-free diet than those on a carbohydrate-free diet (i.e., high-protein diet) at all times of the day. Even when the rats were fed a protein-free diet, the leucine aminopeptidase activity showed clear circadian variation, with a similar pattern to that of rats fed a high protein diet. The maltase activity was lower in rats fed a carbohydrate-free diet than those on a protein-free diet at all times of the day, and a clear circadian rhythm was also observed in rats fed a carbohydrate-free diet. These results suggest that the control mechanism of the rhythms of the digestive enzymes in the small intestine is different from that of dietary induction of the same enzymes.

5475 SMALL-BOWEL RESECTION: ORAL INTAKE IS THE STIMULUS FOR HYPERPLASIA. (Eng.) Levine, G. M.; Deren, J. J.; Yezdimir, E. (111H3 Veterans Admin. Hosp., University and Woodland Avenues, Philadelphia, PA 19104). *Am. J. Dig. Dis.* 21(7):542-546; 1976.

To determine whether p.o. intake is a necessary prerequisite for small intestinal hyperplasia to occur in the residual gut after small bowel resection, the responses in rats that had undergone a 70-cm proximal intestinal resection 1 week previously were compared with those of sham-operated animals. Gut weight (54.1-78.4 mg/cm), mucosal weight (44.4-64.5 mg/cm), protein content (4.60-7.63 mg/cm), and DNA content (0.400-0.474 mg/cm) in each intestinal segment studied were significantly greater in the experimental animals fed a p.o. elemental diet (30% dextrose, 5% amino acids, electrolytes, and vitamins) than in sham-operated animals fed the same diet (34.7-51.8, 25.0-41.7, 2.20-3.82, and 0.244-0.334 mg/cm, resp.), reflecting that significant small bowel hyperplasia occurred both proximal and distal to the anastomosis in the resected animals. In five resected animals fed an i.v. diet identical to that given p.o., the mucosal weight of two bowel segments was greater than in controls. The protein and DNA contents of these segments were not significantly different from controls, indicating the hyperplasia did not occur. There were no differences in gut weight, mucosal weight, mucosal protein, or DNA content between resected or sham-operated rats that received the i.v. alimentation. P.o. intake is a necessary stimulus for small intestinal hyperplasia after resection.

5476 PATHOGENESIS OF SALMONELLA-MEDIATED INTESTINAL FLUID SECRETION: ACTIVATION OF ADENYLATE CYCLASE AND INHIBITION BY INDOMETHACIN. (Eng.) Giannella, R. A.; Gots, R. E.; Charney, A. N.; Greenough, W. B., III; Formal, S. B. (Veterans Admin. Hosp., Lexington, KY 40506). *Gastroenterology* 69(6):1238-1245; 1975.

The mechanisms of Salmonella-mediated ileal secretion, the activation of adenylate cyclase, and the inhibitory action of indomethacin were investigated in adult New Zealand albino rabbits (1.5-2.5 kg). Three ileal loops were constructed (20 cm in length): an experimental loop inoculated with 1.0 ml (10^9 organisms) *Salmonella typhimurium* or 0.1 cholera toxin, a control loop inoculated with sterile broth or boiled cholera toxin, and an uninoculated loop. After inoculation, the animals were sacrificed, and the mucosal homogenates were assayed for adenylate cyclase, cyclic AMP, adenosine 3',5'-monophosphate phosphodiesterase, Na^+-K^+-ATPase and Mg^{++}-ATPase activities, and protein concentration. The TML and SL 1027 strains of *S. typhimurium* were both studied. In some cases, animals were pretreated with indomethacin (30 mg/kg, s.c.) before inoculation with *S. typhimurium.* Infection with the TML strain of *S. typhimurium* produced an increase in mucosal adenylate cyclase activity (468 pmol cyclic AMP/mg protein/10 min) in comparison with controls (203 pmol cyclic AMP/mg/10 min), whereas infection with the SL 1027 strain did not. Cholera toxin produced a twofold increase in adenylate cyclase activity. Neither the bacterial strains nor the cholera toxin produced increases in Na^+-K^+-ATPase or Mg^{++}ATPase activity. Indomethacin pretreatment abolished both fluid secretion and adenylate cyclase activity produced by the TML *S. typhimurium* strain. In animals treated with cholera toxin, fluid secretion was 60% inhibited ($p<0.01$) by indomethacin; the adenylate cyclase level remained unchanged. Na^+-K^+-ATPase and Mg^{++}-ATPase activities were not affected by indomethacin. These results suggest that: *S. typhimurium* causes ileal secretion by stimulating adenylate cyclase, mucosal invasion alone (SL 1027) is not sufficient to activate adenylate cyclase, and Na^+-K^+-ATPase is not involved in salmonella-induced secretion. The mèchanism of salmonella activation of adenylate cyclase is unclear, but apparently differs from that of cholera toxin in that it is inhibited by indomethacin. This might be explained by the participation of prostaglandins in the salmonella activation process.

5477 ENZYMATIC ACTIVITY OF THE RAT SMALL INTESTINAL MUCOSA UNDER HEAT STRESS. (Rus.) Rachimov, K.; Demidova, A. I.; Korotina, N. A. (Inst. Physiology, Acad. Sci. Uzb. SSR, Tashkent, USSR). *Fiziol. Zh. SSSR* 62(4): 609-614; 1976.

5478 THE RHYTHM OF MUCUS FORMATION IN THE SMALL INTESTINAL EPITHELIUM OF RATS AND MICE. (Rus.) Liashko, O. G.; Chirina, L. V.; Kotovoj, Y. O.; Kotovoj, M. J.; Katinas, G. S. (Pavlov First Medical Inst., Leningrad, USSR). *Arkh. Anat. Gistol. Embriol.* 68(7): 91-95; 1975.

5479 POSSIBLE FEATURES OF THE FUNCTIONAL CONDITION OF THE INTESTINE IN HEALTHY CHILDREN. (Rus.) Beier, L. V. (Gorki Scientific Res. Inst. Pediatrics, Russian SSR Ministry Public Health, Gorki, USSR). *Pediatriia* (3):30-31; 1976.

See also, 5369, 5394, 5504.

GENERAL

5480 A SIMPLE METHOD FOR THE CULTIVATION OF RAT LIVER CELLS. (Eng.) Takaoka, T.; Yasumoto, S.; Katsuta, H. (Inst. Medical Science, Tokyo Univ., Shirokanedai, Minato-ku, Tokyo 108, Japan). *Jpn. J. Exp. Med.* 45(5):317-326; 1975.

A simple method for obtaining cultures of rat liver parenchymal cells using a newly developed proteolytic enzyme, Dispase I (a bacterial neutral proteinase), and a new synthetic enzyme, DM-153, is described. Preperfusion was unnecessary for the dissociation of liver cells (obtained from JAR-1 and JAR-2 rats) that were minced and digested in a medium consisting of 10% fetal calf serum and 90% DM-153, in which 1,000 U/ml Dispase had been dissolved. After shaking (37 C for 2-3 hr), filtration, and centrifugation (1,500 rpm for 10 min), the sedimented cells were suspended in a medium of the same composition. Aliquots of 10 ml were incubated at 37 C, and the medium was changed semiweekly. In subculturing, mechanical dispersion or digestion with trypsin (200 U/ml in phosphate-buffered saline) or Dispase I was used. Dispase I was dissolved in the previously described medium and used at room temperature. When the tissues were dissociated by Dispase treatment and cultured, most cells showed spherical shapes in 1 day of cultivation. By 10-14 days, epithelial sheets were sufficiently enlarged to be subcultured. At subculturing using Dispase I, epithelial cell sheets were not dissociated into single isolated cells, but formed small aggregates of epithelial cells. Cinemicrographic observation revealed that the epithelial cells exhibited little locomotion, but active cytoplasmic movement. Cell strains were successively established from liver tissues of embryo and suckling and adult rats. Culturing of cells in arginine-deficient medium indicated that the cultured liver cells were parenchymal cells. Biochemical analysis of two strains revealed that pyruvate kinase, glucose-6-phosphate dehydrogenase, hexokinase, glucokinase, and catalase activities were all present. In one strain in which chromosome analysis was carried out, there was a high frequency of diploid numbers in the karyotype, however, it was a pseudodiploid. Liver cells cultured in this way can be used for experiments in the early stage of serial cultivation.

5481 FUNCTIONAL T CELLS IN RABBITS GUT MUCOSAL LYMPHOCYTES.

(Eng.) Singal, D. P.; O'Neill, M.; Clancy, R.; Bienenstock, J. (Dept. Pathology Medicine, McMaster Univ., Hamilton, Ontario, Canada). *Gut* 17(5):325-327; 1976.

Functional studies of Peyer's patch and gut mucosa lymphocytes were performed in a mixed lymphocyte culture reaction (MLC), an *in vitro* measure of the capacity of thymus-derived cells (T cells) to recognize and respond to cell surface antigens. The studies were conducted in parallel with spleen and thymus lymphocytes from the same donor animals (New Zealand white rabbits) to compare the relative functional capabilities of mucosal lymphocytes. In one experiment, in which lymphoid T cells from one rabbit were responder cells, and mitomycin-treated spleen cells from another rabbit were stimulating cells in the MLC test, the stimulation ratio (SR, ratio of experimental counts/min) for thymus cells as responder cells was 20.49, for spleen cells 10.59, Peyer's patch cells 4.54, and for gut mucosal cells 4.81. In two other experiments, no differences were found in the SR values obtained with these lymphocytes as responder cells. When one-way MLC was performed with spleen cells from a rabbit as responding cells, and mitomycin-treated lymphoid T cells from another rabbit as stimulating cells, the SR with spleen cells as stimulating cells was 11.88, with thymus cells 11.38 and 5.59 (two experiments), with Peyer's patch cells 15.25 and 7.35, and with gut cells 13.73 and 8.03. The mitomycin-treated lymphocytes from Peyer's patch and gut mucosa produced as much proliferative response in allogenic spleen cells as did mitomycin-treated spleen or thymus lymphocytes, demonstrating the capability of these cells to stimulate in the MLC. SR obtained in a Peyer's patch X mitomycin-treated Peyer's patch combination was not different from that obtained for Peyer's patch X mitomycin-treated spleen combination; similar results were obtained for gut mucosa lymphocytes. It is concluded that functional T cells exist in rabbit gut lamina propria and Peyer's patches.

5482 THE ORIGIN OF IMMUNOGLOBULINS IN SALIVARY SECRETION OF SHEEP.

(Eng.) Cripps, A. W.; Lascelles, A. K. (Dept. Veterinary Medicine, Univ. Sydney, Sydney, N.S.W., Australia 2006). *AJEBAK* 54(2):191-195; 1976.

To examine the suggestion that in the external secretory organs of ruminants there is an inverse relationship between the capacity to selectively transfer immunoglobulin (Ig) IgG$_1$ and the development of the IgA secretory system, a comparative study was made on the secretion of IgG$_1$ and IgA into parotid and submaxillary saliva of sheep. The mean flow of submaxillary saliva (5.7 ml/hr) was considerably less than the flow of parotid saliva (40.6 ml/hr), but the output of immunoglobulins was at least five times greater from the submaxillary gland (IgG$_1$, 374.74 μg/hr; IgG$_2$, 59.39 μg/hr; IgA, 2,527.38 μg/hr, compared to 69.32, 13.41, and 74.21 μg/hr, resp., in parotid saliva). The concentration of IgA in the submaxillary gland (505.76 μg/ml) was also extremely high in comparison with the parotid gland (1.19 μg/ml). The relative predominance of the IgA system in the submaxillary gland was made clearer by comparing the IgA:IgG concentration ratios for the two secretions; the mean value for submaxillary saliva was 8.36 compared with a value of only 0.88 for parotid saliva. By expressing the specific activity of IgG$_1$ or IgG$_2$ in saliva as a percentage of the specific activity of the corresponding immunoglobulin in the plasma, it was found that all the IgG$_1$ and IgG$_2$ in saliva was derived from plasma, except IgG$_1$ in the submaxillary saliva of which 15.77% was derived locally. The results suggest that there is no relationship between the selective transfer of IgG$_1$ and the secretion of IgA into the saliva of sheep.

5483 SELECTIVE ENTRY OF IMMUNOBLASTS INTO GUT FROM INTESTINAL LYMPH.

(Eng.) Hopkins, J.; Hall, J. G. (Chester Beatty Res. Inst., Clifton Ave., Downs Rd., Sutton, Surrey SM2 5PX, U.K.). *Nature* 259(5541):308-309; 1976.

The ability of immunoblasts that enter the lymph from somatic nodes to home to the gut was compared with that of immunoblasts from intestinal lymph. The intestinal lymph duct and an efferent duct of one of the peripheral, somatic lymph nodes (popliteal, prefemoral, or prescapular) were cannulated in yearling sheep. Killed bacteria were injected s.c. into the drainage area of the cannulated somatic nodes; 4 days later, 20-40% of the cells in the efferent lymph consisted of immunoblasts. An 8-hr collection of either intestinal or efferent lymph was then incubated with ^{125}I-iododeoxyuridine. The labeled cells were returned to the animals, i.v., and the radioactivity present in the tissues was determined 20 hr later. Immunoblasts originating in the somatic nodes did not enter the small gut, but tended to localize in the spleen; in four experiments, only 0.4-0.9% of the injected radioactivity was present in the small intestine, while 16.0-21.0% of the radioactivity was present in the spleen. Conversely, the percentage of immunoblasts generated in intestinal lymph in the small intestine was 27.0-35.3% in seven experiments, while the percentage of these immunoblasts found in the spleen was only 0.2-1.4%. Immunodiffusion revealed that detergent extracts of washed cells from intestinal lymph always contained immunoglobulin A (IgA) as the major immunoglobulin; extracts of lymph cells from stimulated somatic nodes contained mainly IgG, but no IgA. Furthermore, the immunoblasts from somatic nodes did not acquire the ability to home to the gut even when they were incubated in IgA-rich isologous intestinal lymph plasma. Therefore, one of the intrinsic cellular factors that mediates the extravasation of immunoblasts in the small gut must be the production of IgA or a closely-associated molecule.

5484 FACTORS WHICH DETERMINE THE ACCUMULATION OF IMMUNOBLASTS IN GUT AND SKIN. (Eng.)

Parrott, D. M. V.; Rose, M. L.; de Freitas, A.; Bruce, R. G.; Sless, F. (Western Infirmary, Glasgow G11 6NT, Scotland). *Agents Actions* 6(1/3):32-39; 1976.

The capacity of immunoblasts from two sources (peripheral lymph nodes draining the site of application of a contact sensitizer and mesenteric lymph nodes from mice infected with the gut parasite, *Trichinella spiralis*) to migrate to the gut and to inflamed skin sites was compared. The cells were labeled with ^{125}I-iododeoxyuridine and transferred to syngeneic recipients. The peripheral lymph node blasts readily entered skin sites in a nonspecific way, but failed to migrate to the gut, even when inflammation was induced. By contrast, the mesenteric lymph node blasts readily migrated to the gut in normal mice and in increased amounts to the gut of mice infected with *T. spiralis* or inflamed with p.o. turpentine. A small proportion of mesenteric lymph node blasts did, however, migrate, nonspecifically to the skin, but in much smaller amounts than peripheral lymph node blasts. It is concluded that the migration of immunoblasts to the gut has some specificity related to the source from which the cells were taken, but little specificity with regard to intraluminal antigen.

5485 THE DEFINITIVE VALUE OF ACTIVE-SPECIFIC IMMUNOTHERAPY FOR EXPERIMENTAL CARCINOMA OF THE COLON. (Eng.)

Enker, W. E.; Jacobitz, J. L. (Univ. Chicago Hosp., Dept. Surgery, 950 E. 59th St., P.O. Box 441, Chicago, IL 60637). *Surgery* 80(2):164-170; 1976.

The value of active-specific therapy for colon cancer was studied in syngeneic Wistar/Furth rats with WFCC-3 adenocarcinoma of the colon, induced by 1,2-dimethylhydrazine-diHCl. Adult, age-matched rats were inoculated i.p. with 2 x 10^5 viable tumor cells on day zero. All tumor cells had received 5,000 rads of x-irradiation before injection. Rats were immunized s.c. eight times through the first 21 days after tumor inoculation, and then weekly until day 35. The experiments were ended at day 180. The rats were divided into five treatment groups, which were immunized, resp., with concanavalin A (Con A)-modified tumor cells, vibrio cholerae neuraminidase (VCN)-modified tumor cells, cells modified with both agents, unmodified cells, and a tissue culture medium. Immunotherapy with both modified and unmodified cells resulted in a better absolute survival rate than did sham treatment. At 113 days after tumor inoculation, 80% of the sham-treated animals were dead, while 50% of these animals immunized with unmodified tumor cells were alive with no evidence of ascites. The survival of animals treated with Con A-modified cells was 60% and that of animals treated with VCN or both agents was 70%. Immunotherapy with VCN or both agents resulted in a statistically better survival rate than did sham therapy ($p<0.05$). There was no significant difference in survival between tumor cell and modified tumor cell therapy nor between tumor cell and sham therapy. At 180 days after tumor implantation there were no remaining rats with detectable ascites or other evidence of illness. The results indicate that active-specific immunotherapy with VCN or Con A-modified syngeneic tumor cells for experimental colon and rectal cancer may be an effective form of inhibiting tumor growth and achieving cure, and is a promising form of postoperative adjuvant therapy for human colon cancer.

5486 PATHOPHYSIOLOGY OF AGANGLIONIC COLON SEGMENT: AN EXPERIMENTAL STUDY ON AGANGLIONOSIS PRODUCED BY A NEW METHOD IN THE RAT. (Eng.)

Imamura, K.; Yamamoto, M.; Sato, A.; Kashiki, Y.; Kunieda, T. (Gifu Univ. Sch. Medicine, Tsukasa-machi, Gifu, Japan). *J. Pediatr. Surg.* 10(6):865-873; 1975.

The pathophysiology of an experimentally produced aganglionic colon segment in albino Wistar rats was evaluated to determine the mechanisms by which the defect of the intramural nerve plexi in Hirschsprung's disease induces narrowing of the intestinal segment and by which it causes the disappearance of peristalsis. Aganglionosis was induced in a colonic segment proximal to the peritoneal reflection by intraluminal filling with 0.01% corrosive sublimate in normal saline solution maintained at 50 mm Hg for 1 hr. When the length of the aganglionic segment was more than 3 cm, ileus appeared and megacolon proximal to a narrow segment was observed. Histologically and histochemically, total denervation was observed in the aganglionic segment; this is in contrast to findings in narrow segments of Hirschsprung's disease, in which intramural extraneous nerves are increased. When aganglionic colonic segments were observed under physiologic pressure, neither the high amplitude rhythmic contraction waves nor a reaction to stretch stimulation was observed. When 5 x 10^{-5} g/ml of barium chloride was applied to the same colonic segments, high amplitude rhythmic waves appeared, but there was still no inhibitory reaction to stretch stimulation. There may be contributing factors other than aganglionosis in the etiology of Hirschsprung's disease of the ultrashort segment, if this entity of the disease really exists. Aperistalsis observed in experimental aganglionic segments and that observed in aganglionic segments of Hirschsprung's disease seems to be based on the absence of the nonadrenergic, noncholinergic nerves.

5487 NEURAL CONTROL OF BLOOD FLOW IN GASTRIC MUCOSA. (Eng.) Kalahanis, N. G.; Das Gupta, T. K.; Nyhus, L. M. (Univ. Illinois Medical Center, 840 South Wood St., Chicago, IL 60612). *Am. J. Surg.* 131(1):86-90; 1976.

The mode of innervation of the small blood vessels in the fundic mucosa of male Sprague-Dawley rats was studied ultrastructurally, and the effects of vagotomy on this innervation were investigated. In control animals, individual axons either in the form of nerve endings or axonal varicosities devoid of Schwann cell sheaths were frequently seen in intimate contact with the vascular wall. In tissue examined from 24 hr to 7 days after vagotomy, a number of axonal profiles showed signs of degeneration, i.e., empty spaces in the axoplasm, vacuolation, myelin figures in the mitochondria, and clumping of empty vesicles. Only a relatively small proportion of nerve endings had undergone degeneration, even after 7 days. Nerve endings innervating the arterioles were also found to be degenerated. The morphology of capillaries was different from that in the controls. In cross sections, the capillary endothelium was thinner, there were fewer endothelial cell projections inside the lumen, and the capillary fenestrae seemed to be wider. These findings provide morphologic evidence for the neural control of blood flow in the rodent gastric mucosa.

5488 PRIMATE GASTRIC CIRCULATION: EFFECTS OF CATECHOLAMINES AND ADRENERGIC BLOCKADE. (Eng.) Zinner, M. J.; Kerr, J. C.; Reynolds, D. G. (Walter Reed Army Inst. Res., Washington, DC 20012). *Am. J. Physiol.* 230(2):346-350; 1976.

The effects of intra-arterial injections and infusions of epinephrine, norepinephrine, and isoproterenol on gastric blood flow were studied in 10 anesthetized baboons. Blood flow was measured electromagnetically before and after alpha-adrenergic blockade with phenoxybenzamine hydrochloride (1.5 mg/kg) or beta-adrenergic blockade with propranolol (0.5 mg/kg, i.v.). Using saline as a diluent, the catecholamines were injected intra-arterially as a 0.1-ml bolus in doses ranging logarithmically from 10^{-3} to 10^{0} μg (base)kg. At 10^{-3} μg/kg, epinephrine elicited a decrease in blood flow of 0.35 ± 0.12 ml/min/kg; as the dose was increased, the constrictor response increased to 2.90 ± 0.36 ml/min/kg at the highest dose. Alpha-adrenergic blockade significantly reduced this vasoconstrictor response ($p<0.001$), although beta-adrenergic blockade had no effect. Intra-arterial injection of norepinephrine over the same dose range resulted in a similar response; at the highest dose, the decrease in flow was 2.42 ± 0.39 ml/min/kg, and alpha-adrenergic blockade significantly attenuated the response ($p<0.01$). The injection of isoproterenol resulted in a linearly dependent increase in blood flow with increasing doses; at the highest dose, blood flow increased 2.06 ± 0.39 ml/min/kg. Only beta-adrenergic blockade affected the responses ($p<0.001$). When epinephrine and norepinephrine were infused (0.05 μg [base]/kg/min, 10 min), sustained vasoconstriction was seen, with no evidence of autoregulatory escape and no postinfusion "overshoot." At 3 min of infusion of epinephrine and norepinephrine, the blood flow had decreased to 1.27 ± 0.32 ml/min/kg and 2.18 ± 0.28 ml/min/kg, resp. There was a sustained increase in flow during the infusion of the same dose of isoproterenol, which was significantly attenuated by beta-adrenergic blockade. The results indicate a species difference in the adrenergic mechanisms of the gastric circulation between the dog and the subhuman primate. Epinephrine and norepinephrine might provide alternatives to vasopressin as a vasoconstrictor for the control of upper gastrointestinal bleeding.

5489 CHANGES IN INTESTINAL VASCULAR DIAMETER DURING NOREPINEPHRINE VASOCONSTRICTOR ESCAPE. (Eng.) Guth, P. H.; Ross, G.; Smith, E. (Veterans Admin. Wadsworth Hosp., Los Angeles, CA 90073). *Am. J. Physiol.* 230(6):1466-1468; 1976.

The hypothesis that escape from norepinephrine (NE)-induced vasoconstriction in the intestine is due to relaxation of initially constricted vessels was tested in 18 anesthetized cats. Intestinal blood flow was measured by an electromagnetic probe on the superior mesenteric artery. Intestinal submucosal and muscle arterioles and small mesenteric arteries were studied by *in vivo* microscopy with an image-splitting technique. Continuous recordings of mesenteric flow and vessel diameter were made during the infusion of NE (1-2 μg/min for 3 min) into the superior mesenteric artery. Mesenteric flow decreased soon after the NE infusion began, but then escaped. Microscopically, arterial constriction and escape were noted in submucosal, muscle, and mesenteric vessels, with a time course similar to that for flow. The mean escape index for flow for the 18 cats was 0.60 ± 0.05. The mean escape from constriction in the small mesenteric artery, muscle arteriole, and submucosal arteriole was 93.7, 106.9, and 92.6% of the control, resp. Arteriovenous anastomoses were not seen. These findings support the hypothesis that escape from NE-induced vasoconstriction is due to relaxation of initially constricted vessels.

5490 ABSENCE OF A CIRCADIAN RHYTHM IN CRYPT CELL MITOTIC RATE FOLLOWING CHEMICAL SYMPATHECTOMY IN RATS. (Eng.) Tutton, P. J. M. (Dept. Anatomy, Monash Univ., Clayton, Victoria, 3168, Australia). *Virchows Arch.* [*Cell Pathol.*] 19(2):151-156; 1975.

To evaluate the proposal that adrenergic neurons of the mucosal plexus are an important factor in regulating crypt cell proliferation, the circadian rhythm in food intake and in mitotic rate of jejunal crypt cells was examined in normal Sprague-Dawley rats that were chemically sympathectomized by 6-hydroxydopamine (100 mg/kg, i.v.). The rats were maintained in darkness from 21.00 to 07.00 hr. Both normal and sympathectomized animals showed a distinct circadian rhythm in food intake, with a peak during the interval 00.00 to 04.00 hr and a nadir around 08.00 to 12.00 hr. At no stage was there a statistically significant difference between the 4-hourly food consumption in control and sympathectomized animals. The mitotic rates in controls showed a distinct circadian rhythm, with a peak of 0.076 mitoses/cell/hr between 00.00 and 04.00 hr and a nadir of 0.029 mitoses/cell/hr between 06.00 and 10.00 hr. In contrast, only small variations were seen between mitotic rates at different times of the day; the mean mitotic rates were 0.037 at 00.00-04.00 hr, 0.041 at 06.00-10.00 hr, 0.032 at 12.00-16.00 hr, and 0.032 at 18.00-22.00 hr. The results show that in normal rats, the circadian rhythm in the crypt cell mitotic rate is closely correlated to that in food consumption, and that following chemical sympathectomy, the circadian rhythm in food consumption persists, but that in cell proliferation does not. The normal circadian rhythm in crypt cell proliferation may be mediated by variations in the rate of release of noradrenalin from the neurons of the mucosal plexus. Alternatively, normal secretion of noradrenalin by the neurons of the mucosal plexus may be a necessary cofactor for some other mechanism (e.g., a chalone), which controls the circadian rhythm in the crypt cell mitotic rate.

5491 CLEARANCE RATE, HALF-LIFE, AND SECRETORY POTENCY OF HUMAN GASTRIN-17-I IN DIFFERENT SPECIES.

(Eng.) Boniface, J.; Picone, D.; Schebalin, M.; Zfass, A. M.; Makhlouf, G. M. (Medical Coll. Virginia, Richmond, VA). *Gastroenterology* 71(2):291-294; 1976.

To test the hypothesis that a given dose of exogenous gastrin I should elicit higher serum concentrations in man compared with smaller animals, the clearance rates of synthetic human gastrin-17-I were measured in two human volunteers, four dogs, and four cats. The half-life of disappearance and acid secretory potency (D$_{50}$) were also measured in man and dog. The human subjects received four 60-min i.v. infusions of gastrin-17-I (5.4-343 pmol/kg/hr) and two prompt i.v. injections of gastrin (21 and 84 pmol/kg). The dogs received two 60-min infusions (164 and 328 pmol/kg/hr), and cats received an infusion of 328 pmol/kg/hr. The mean clearance rates in the dogs (2.9 l/kg/hr) and cats (8.1 l/kg/hr) were, resp., 3 and 8 times greater than in man (1.05 l/kg/hr). Accordingly, the mean half-life of gastrin-17-I in the dog (3.5 min) was 3 times shorter than in man (10.6 min). The mean D$_{50}$ in the human subjects was 42 pmol/kg/hr, while the mean D$_{50}$ in dogs was approximately 150 pmol/kg/hr. These exogenous doses, yielded approximately similar increments of serum gastrin in the two species, a clear indication that normal man and dog are equally sensitive to gastrin-17-I at a cellular level. In the cat, the D$_{50}$ was also dependent on the gastrin clearance rate. An inverse allometric relation between clearance rate and body weight was consistent with the known greater efficiency of metabolic and eliminatory processes in species of small size. Recent studies of the disposal of other gastrointestinal hormones indicate that the concepts developed theoretically for secretory stimulants, and confirmed experimentally for gastrin-17, may have wider applicability.

5492 EFFECTS OF 13-nle-MOTILIN ON SALIVARY, GASTRIC, AND PANCREATIC SECRETIONS IN MAN.

(Eng.) Domschke, S.; Domschke, W.; Schmack, B.; Tympner, F.; Junge, O.; Wunsch, E.; Jaeger, E.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nuremberg, D-852 Erlangen, W. Germany). *Am. J. Dig. Dis.* 21(9):789-792; 1976.

Because previous studies have shown that natural and synthetic motilin enhances gastric pepsin output with no change in acid secretion in dogs and man, the potential effects of synthetic motilin, 13-norleucine-motilin (13-nle-motilin), on human salivary, gastric, and pancreatic secretions were studied. Healthy subjects received a continuous infusion of 13-nle-motilin (0.1 μg/kg/hr, i.v.). In six volunteers, pepsin secretion (2,616 ± 1,134 IU/hr) was significantly elevated over the mean basal level (1,714 ± 1,045 IU/hr, $p<0.05$) within 60 min of 13-nle-motilin infusion. Enhanced secretion was not associated with increased cyclic AMP output (mean basal level=257 ± 54 pmol/mg DNA; after motilin=262 ± 28 pmol/mg DNA). The gastric protein output and the basal acid output were unaltered by 13-nle-motilin; the latter result was in keeping with unchanged mean serum gastrin levels amounting to 69 ± 41 pg/ml before and 66 pg/ml after 13-nle-motilin administration. In the same six subjects, the infusion of 13-nle-motilin produced no significant changes from basal levels of bicarbonate, amylase, or protein contents of the saliva, or in its volume. In the five subjects tested, 13-nle-motilin did not significantly change the bicarbonate, amylase, trypsin, chymotrypsin, or lipase secretion of the pancreas from the basal levels. The bicarbonate output rose from a median basal level of 0.2 mEq/hr to 30.6 mEq/hr after secretin infusion (1 clinical U/kg/hr, i.v.), and the administration of 13-nle-motilin combined with secretin produced an identical value for the median bicarbonate output. Increases in pancreatic enzyme secretion after secretin alone or combined with 13-nle-motilin were not statistically significant. These studies show that the pepsigogic effect of 13-nle-motilin is not accompanied by any appreciable change in gastric H$^+$ secretion, which is compatible with the fact that serum gastrin levels remain unchanged by 13-nle-motilin. Cyclic AMP apparently does not serve a messenger role in 13-nle-motilin-stimulated pepsin secretion.

5493 SELECTIVE SYNTHESIS AND ACCUMULATION OF NUCLEAR NON-HISTONE PROTEINS DURING CARCINOGENESIS OF THE COLON INDUCED BY 1, 2-DIMETHYL-

HYDRAZINE. (Eng.) Boffa, L. C.; Vidali, G.; Allfrey, V. G. (The Rockefeller Univ., New York, NY 10021). *Cancer* 36(6):2356-2363; 1976.

The changes in the nuclear protein composition of colonic epithelial cells during 1,2-dimethylhydrazine (DMH)-induced carcinogenesis, particularly those in the nonhistone proteins, were studied in CFN (Wistar strain) male rats. Rats were given DMH (20 mg/kg, s.c.) and killed after 3, 7, 9, 11, 13, 15, 17, 19, and 21 weeks, 1 week after the last treatment. Nuclei were isolated from the colonic epithelium, the proteins were extracted, and the nonhistone proteins were analyzed by electrophoresis in polyacrylamide gels. Amino acid analyses were done on the prominent protein bands, and double-labeling experiments were performed to compare the rates of nuclear protein synthesis in treated and control rats. Electrophoresis of protein from tumors appearing during the 21st week of treatment showed a clear difference between the banding patterns of the tumor protein and of protein from control rats and normal epithelium surrounding the tumor. There were striking increases in proteins of molecular weights 44,000, and 62,000 that dominated the nonhistone protein profile in the tumor cell nuclei. There was a progressive increase in the nuclear concentration of these two proteins after increasing times of exposure to DMH. By the 21st week, nuclei had over three times the content of proteins with molecular weights of 44,000 and 62,000 more than in the third week. Using the 62,000 molecular weight protein as an index, the percentage of transformed cells ranged from 19 ± 4% at 7 weeks to 45 ± 8% at 19 weeks of treatment. ^{14}C-leucine incorporation into the nuclear protein of normal intestinal epithelium was compared with that of ^{3}H-leucine in rats treated with DMH for 4 weeks. The ratio of incorporation of the two labels was constant for most of the nuclear proteins, except for two divergent bands in the 40-45,000 and 60-65,000 molecular weight regions. When the labels given to treated and untreated rats were reversed, the ratio showed inversions in the same region of the gel. Amino acid analysis of the two bands showed both to be highly acidic, with a predominance of glutamic and aspartic acids over lysine, arginine, and histidine. Proline, cysteine, and methionine were lacking in both bands. The results indicate that carcinogenesis of the colon involves a selective accumulation within the nucleus of two protein classes, the syntheses of which are selectively accelerated very early after administration of the carcinogen.

5494 THE INFLUENCE OF HYPERCALCEMIA ON BASAL AND CHOLECYSTOKININ-STIMULATED PANCREATIC, GALLBLADDER, AND GASTRIC FUNCTIONS IN MAN.

(Eng.) Malagelada, J.-R.; Holtermuller, K. H.; Sizemore, G. W.; Go, V. L. W. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 71(3):405-408; 1976.

Because clinical and experimental evidence indicates that hypercalcemia affects gastrointestinal function, the effects of hypercalcemia on basal and cholecystokinin (CCK)-stimulated pancreatic, biliary, and gastric outputs were investigated in 11 healthy subjects by a gastroduodenal perfusion technique. During normocalcemia, a submaximal CCK stimulus [0.016 Crick-Harper-Raper (CHR) U/kg/min, i.v.] increased trypsin output from a mean basal level of 2.6 kg/hr to 9.8 kg/hr, and maximal stimulation (0.25 CHR U/kg/min) produced a further increase (45.0 kg/hr). During hypercalcemia, which was induced by a 2-hr i.v. loading dose of 4 mg/kg/hr $CaCl_2$ followed by a maintenance dose of 1.75 mg/kg/hr, the mean basal rate of trypsin secretion (4.8 kg/hr) was higher than during normocalcemia. Submaximal stimulation with CCK produced an increase to 16.2 kg/hr. The difference between submaximal trypsin outputs with and without hypercalcemia was greater than the increment caused by hypercalcemia on basal enzyme output ($p<0.05$), suggesting that hypercalcemia potentiated CCK action on pancreatic enzyme secretion. In contrast, the trypsin response to maximal CCK stimulation (50.9 kg/hr) was not increased by hypercalcemia. Only the maximal CCK stimulus produced gallbladder contraction, resulting in a sharp peak of bilirubin output; this was magnified by hypercalcemia. The mean accumulated (3-hr) bilirubin output was significantly greater with hypercalcemia (116.7 mg) than without (69.3 mg, $p<0.01$), suggesting that hypercalcemia potentiates the stimulatory action of CCK on the gallbladder. During normocalcemia, the submaximal CCK stimulation significantly increased gastric acid output from a mean basal level of 1.2 mEq/hr to 2.5 mEq/hr; the maximal stimulation increased it to 3.4 mEq/hr. Hypercalcemia significantly increased the basal level to 2.9 mEq/hr, the submaximally stimulated level to 4.5 mEq/hr, and the maximally stimulated level to 4.8 mEq/hr. The serum gastrin levels were unaffected by CCK infusion, but hypercalcemia slightly but significantly increased the levels ($p<0.05$). These studies suggest that hypercalcemia in man affects pancreatic and gastric secretory functions and enhances the responsiveness of pancreas and gallbladder to hormonal stimulation with CCK.

5495 TOTAL DEVASCULARIZATION OF THE LIVER: AN EXPERIMENTAL MODEL OF ACUTE LIVER FAILURE.

(Eng.) Tonnesen, K. (Dept. Medicine A, Rigshospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 37):23-26; 1976.

An experimental model of clinical liver failure, using total devascularization of the liver, was tested in six pigs. The mean survival time was 1,496 min. The immediate cause of death was cardiovascular collapse. The mean serum sodium concentration was significantly less postoperatively (134 mEq/l) than preoperatively (140 mEq/l), and the mean serum potassium concentration was significantly greater postoperatively (7.0 mEq/l) than preoperatively (4.1 mEq/l). The terminal drop in blood pressure was not responsible for these changes, since the blood pressure remained stable while the changes were statistically significant. The mean concentration of lactate in the cerebrospinal fluid was significantly increased in the experimental pigs just prior to death (5.72 mM) in comparison to that in normal pigs (1.65 mM). This was probably not due to cerebral anoxia, as the potassium concentration remained constant (3.2 mM in normal pigs; 3.8 mM in experimental pigs). The mean cerebrospinal fluid glucose concentration was significantly lower in the animals with liver insufficiency (2.69 mM) than in nonoperated animals (3.32 mM), and the cerebrospinal fluid to blood ratio was significantly decreased (from 0.79 to 0.43). This suggests that anaerobic glycolysis is responsible for the increased lactate concentration in the animals with liver insufficiency. The decreased cerebrospinal fluid glucose concentration may be caused by a decreased permeability through the blood brain barrier.

5496 A NEW METHOD TO STUDY THE HEALING DYNAMICS OF ACUTE GASTRIC EROSIONS AND ITS APPLICATION ON RESTRAINED RATS. (Eng.) Dutton, J. W.; Gwise, P. J.; Chiu, C. J.; Mersereau, W. A.; Hinchey, E. J. (Montreal General Hosp., Montreal, Quebec H3G 1A4, Canada). *J. Surg. Res.* 20(5):499-504; 1976.

Experiments were carried out in female Sprague-Dawley rats to establish a normal healing curve for acute gastric stress erosions and to determine if erosions occur at anatomically predetermined locations, subject to recurrent ulceration following repeated episodes of stress. Stress consisted of placing the rats in restraint cages in a darkened, cold room at 4 C for 3 hr. In rats killed immediately after being stressed (10 rats), typical acute erosions were grossly recognized by the presence of blood in the ulcer crater Ten groups of 10 rats each were subjected to stress and then injected i.v. with 0.2 mg of colloidal carbon (particle diameter 100-200 A); the surviving rats in each group were sacrificed at daily intervals from 1-10 days after stress. Biopsies of erosions taken every day following stress were grossly recognized by the presence of carbon particles. Almost all the acute erosions showed reestablishment of an intact, superficial epithelial layer by 24-48 hr. However, a crater remained, and the gastric glands beneath the intact epithelium were disorganized or incomplete. By day 5, more than 50% of the biopsied lesions were healed (defined as the return of a normal glandular pattern and the absence of a mucosal crater). By day 10, more than 90% of the biopsies were healed. Restressing of 20 rats 8 days following an initial stress resulted in the formation of acute gastric erosions similar to those seen following the initial insult. Biopsies of 21 carbon-labeled areas revealed that 19 erosions had healed during the 8-day period. None of the healed, carbon-labeled areas showed evidence of repeated mucosal damage as a result of the second episode of cold restraint, suggesting that there are no anatomically predetermined sites for the formation of acute stress erosions in this model.

5497 A METHOD OF CHOLECYSTOGRAPHY APPLICABLE TO SMALL LABORATORY ANIMALS. (Eng.) Poilly, J.-N.; Halls, J. M.; Buckley, G. C.; Currie, D. J. (St. Michael's Hosp., Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 71(2):228-231; 1976.

A method of i.p. cholecystography is described; it was tested in mice, guinea pigs, and rabbits with experimentally induced gallstones. Twenty-two female Swiss mice were given i.p. injections of 51.6% meglumine iodipamide (3 ml/kg) diluted 10-fold with water. Plain posterior-anterior radiographs of the abdomen were taken 2 hr later; the mice were then fed for 8 weeks on a lithogenic diet. Intraperitoneal cholecystography was repeated using the same dose of meglumine iodipamide; 3-4 days later, a repeat dose of 5 ml/kg was given in cases of nonvisualization of the gallbladder. Twenty mice on the normal diet gave a good gallbladder shadow with the first dose, and the other two gave a satisfactory cholecystogram when the dose was increased to 4 ml/kg. After 8 weeks on the lithogenic diet, cholecystography failed to visualize the gallbladder in 19 mice. All 19 were found to have small gallstones at laparotomy. Two of the three remaining mice had no stones. Intraperitoneal cholecystograms were performed in guinea pigs using doses of contrast medium up to 6 ml/kg diluted 5- to 10-fold, and in rabbits using 4 ml/kg diluted 2- to 3-fold. The gallbladders in both species were opacified, the guinea pig requiring at least 5 ml/kg of contrast medium. The reason for nonopacification of the gallbladders containing stones remains unclear, but previous studies have suggested that in acute cholecystitis, protein leaks into bile and brings about an inflammatory exudate that dilutes any radioopaque material within it.

5498 PORCINE PANCREATIC TRANSPLANTS. II. ALLOTRANSPLANTATION OF DUCT LIGATED SEGMENTS. (Eng.) Kyriakides, G. K.; Arora, V. K.; Lifton, J.; Nuttall, F. Q.; Miller, J. (Veterans Admin. Hosp., 54th St. and 48th Ave. South, Minneapolis, MN 55417). *J. Surg. Res.* 20(5):461-466; 1976.

The effects of glucagon, methylprednisolone, and azathioprine, either alone or in various combinations, on factors complicating segmental pancreatic allografts were studied. Segmental duct-ligated pancreatic allografts were performed in female pigs. Control, untreated grafts underwent significant destruction secondary to inflammation and rejection within 2 weeks of transplantation. In contrast, treatment with methylprednisolone (1 g/day, i.m.) prevented these changes and preserved both the endocrine and exocrine functions of the allografts. Because of continuing exocrine function, large quantities of amylase-rich peripancreatic fluid accumulated and became secondarily infected. The addition of glucagon (4 mg twice daily, i.m.) to this regimen significantly inhibited exocrine pancreatic function and prevented fluid accumulation and peripancreatic abscess formation. In animals treated with methylprednisolone alone or in combination with azathioprine (5 mg/kg), the mean serum levels of amylase at sacrifice (2,167 and 2,621 U/100 ml, resp.) were significantly higher than levels before transplant (1,150 and 1,355 U/100 ml, resp.); in the groups treated with Solu-Medrol plus glucagon or with methylprednisolone, glucagon, and azathioprine, there were no significant differences in the serum amylase levels before transplant (1,270 and 1,551 U/100 ml, resp.) and at sacrifice (1,717 and 2,070 U/100 ml, resp.). In conclusion, methylprednisolone prevents the inflammation, fibrosis, and rejection of duct-ligated pancreatic allografts, but allows large quantities of amylase-rich peripancreatic fluid to accumulate and become infected. This can be prevented by glucagon administration, which inhibits the exocrine pancreatic function.

5499 BIOSYNTHESIS OF 5-METHOXY-N-ACETYL TRYPTAMINE (MELATONIN) IN THE ENTEROCHROMAFFIN CELLS. (Rus.) Raikhlin, N. T.; Kvetnoy, I. M. (Inst. Experimental and Clinical Oncology, USSR Acad. Medical Sciences, Moscow, USSR). *Probl. Endokrinol. (Mosk.)* 22(2):106-108; 1976.

5500 DIURNAL VARIATION IN ENDOGENOUS PRODUCTION OF CARBON MONOXIDE: EFFECT OF CALORIC RESTRICTION. (Eng.) Mercke, C. Cavallin-Stahl, E.; Lundh, B. (Univ. Hosp., Lund, Sweden). *Acta Med. Scand.* 198(3):161-164; 1975.

5501 ANTI-INFLAMMATORY ACTIVITY OF THIABENDAZOLE AND ITS RELATION TO PARASITIC DISEASE. (Eng.) Van Arman, G. G.; Campbell, W. C. (Merck, Sharp & Dohme Res. Lab., West Point, PA). *Tex. Rep. Biol. Med.* 33(2):303-311; 1975.

5502 MORPHOLOGICAL CHANGES IN THE NERVOUS APPARATUS OF THE PHARYNX, ESOPHAGUS AND STOMACH OF THE CAT AFTER A SINGLE GRAVITATION STRESS. (Rus.) Knokin, I. F. (Kirov Military Medical Acad., Leningrad, USSR). *Arkh. Anat. Gistol. Embriol.* 68(7):33-35; 1975.

5503 ANISOTROPY OF THE SALIVARY GLANDS STUDIED BY TOPO-OPTIC HISTOCHEMICAL REACTIONS (Fre.) Gotzos, V.; Musy, J. P. (Institut d'Histologie et d'Embryologie Generale, Universite de Fribourg, Suisse). *Ann. Histochim.* 20(2):113-117; 1975.

5504 SITES OF ORGANIC ACID PRODUCTION AND PATTERN OF DIGESTA MOVEMENT IN THE GASTROINTESTINAL TRACT OF GEESE. (Eng.) Clemens, E. T.; Stevens, C. E.; Southworth, M. (New York State Veterinary Coll., Cornell Univ., Ithaca, NY 14853). *J. Nutr.* 105(10):1341-1350; 1975.

5505 DEVELOPMENT OF THE HUMAN GASTROINTESTINAL TRACT: A REVIEW. (Eng.) Grand, R. J.; Watkins, J. B.; Torti, F. M. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 70(5):790-810; 1976.

5506 SECRETIN, CHOLECYSTOKININ AND NEWER GASTROINTESTINAL HORMONES (FIRST OF TWO PARTS). (Eng.) Rayford, P. L.; Miller, T. A.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *N. Engl. J. Med.* 294(20):1091-1101; 1976.

5507 ENLARGEMENT OF THE CAECUM IN THE RAT. (Eng.) Butterworth, K. R.; Lake, B. G.; Mason, P. L.; Rowland, I. R. (British Industrial Biological Res. Assoc., Woodmansterne Rd., Carshalton, Surrey, SM5 4DS, England). *Br. J. Pharmacol.* 55(2): 260P; 1975.

5508 ANTIGEN BINDING CELLS IN RABBIT PEYER'S PATCHES AFTER INTESTINAL IMMUNISATION [Abstract]. (Eng.) Wansbrough-Jones, M. H.; Pepys, M. B.; Doe, W. F. (Royal Postgraduate Medical Sch., Du Cane Rd., London, W12 OHS England). *Gut* 17(5): 400; 1975.

5509 CARCINOEMBRYONIC ANTIGEN IN THE BLOOD SERUM OF RATS IN NONSPECIFIC AFFECTIONS OF THE INTESTINE. (Rus.) Pozharissky, K. M.; Okulov, V. B. (N. N. Petrov Res. Inst. Oncology, USSR Ministry Public Health, Leningrad, USSR). *Biull. Eksp. Biol. Med.* 81(4):467-470; 1976.

5510 5'-NUCLEOTIDASE IN LIVER PLASMA MEMBRANE AND IN THE SERUM OF NORMAL AND JAUNDICED RATS. (Eng.) Issa, F. S.; Mullock, B. M.; Hinton, R. (Wolfson Bioanalytical Center, Univ. Surrey, Guildford GU2 5XH, Surrey, U.K.). *Biochem. Soc. Trans.* 4(1):55-58; 1976.

5511 ASSOCIATION OF PLUTONIUM WITH ISOLATED LIVER PARENCHYMAL CELLS FOLLOWING INJECTION OF MONOMERIC PLUTONIUM INTO MICE. (Eng.) Bhattacharyya, M. H.; Lindenbaum, A. (Argonne Natl. Lab., Argonne, IL 60439). *Radiat. Res.* 66:552-565; 1976.

5512 PECULIARITIES OF RESTORATION AND GROWTH IN THE LIVER OF DIFFERENT STRAINS OF THREE-WEEK-OLD MICE. (Rus.) Sidorova, V. F.; Yudina, N. V. (Inst. Human Morphology, USSR Acad. Medical Sciences, USSR). *Biull. Eksp. Biol. Med.* 81(4): 475-477; 1976.

5513 EXTRACORPORAL LIVER PERFUSION, A THERAPY TRIAL IN ACUTE HEPATIC INSUFFICIENCY IN THE PIG AND IN BABOON. (Fre.) Cavallari, A.; Mazziotti, A.; Ussia, G.; Possati, L. (Second Clinic Surgery, Bologna Univ. Bologna, Italy). *Lyon Chir.* 72(1):71-74; 1976.

5514 EXPERIMENTAL LIVER REGENERATION: CONTRIBUTION OF MICROCIRCULATION STUDIES. (Fre.) Bourgeon, R.; Isman, H.; Brisard, M.; Letourneau, J. (Hopital Saint-Roch, 5, rue P.-Devoluy, 06000 Nice, France). *Bull. Acad. Natl. Med. (Paris)* 159(6): 471-474; 1975.

5515 CHEMICAL SYNTHESIS AND CHARACTERIZATION OF GLUCURONIC ACID COUPLED MONO-, DI- AND TRIHYDROXY BILE ACIDS. (Eng.) Back, P.; Bowen, D V. (Medizinische Universitatsklinik, Hugstetter Strasse 55, D-7800 Freiburg/Br., Germany). *Hoppe Seylers Z. Physiol. Chem.* 357(2):219-224; 1976.

5516 IMPORTANCE OF LYMPHATIC DRAINAGE IN ISCHEMIA OF THE LIVER. II. CHANGES OF GLUCOSE AND LACTIC ACID. (Cze.) Bartos, V.; Vosmik, J.; Vucinic, M.; Pavlik, E. (Centrum Vyzkumu transplantaci organu, Institutu klinicke a experimentalni mediciny, Budejovicka 800, Praha 4-Krc, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(4): 258-263; 1975.

5517 BIPHASIC EFFECT OF ADRENALIN ON THE STOMACH ULCER IN RATS. (Jpn.) Douzaki, T.; Imai, K.; Mizukami, S. (Shionogi Res. Lab., Shionogi and Co. Ltd., Fukushima-ku, Osaka 553, Japan). *Folia Pharmacol. Jpn.* 71(5):405-414; 1975.

5518 THE BIOCHEMICAL PATHOLOGY OF ASPIRIN-INDUCED GASTRIC DAMAGE. (Eng.) Rainsford, K. D. (Univ. Tasmania Medical Sch., G.P.O. Box 252C, Hobart, Tasmania, Australia 7001). *Agents Actions* 5(4):326-344; 1975.

See also, 5392, 5406, 5546, 5731, 5890, 5919.

DIAGNOSTIC PROCEDURES

5519 ENDOSCOPIC COMPLICATIONS. RESULTS OF THE 1974 AMERICAN SOCIETY FOR GASTROINTESTINAL ENDOSCOPY SURVEY. (Eng.) Silvis, S. E.; Nebel, O.; Rogers, G.; Sugawa, C.; Mandelstam, P. (Veterans Admin. Hosp., 54th St. and 48th Ave., Minneapolis, MN 55417). *JAMA* 235(9):928-930; 1976.

A survey of complications resulting from endoscopy was carried out. Esophagogastroduodenoscopy (211, 410 examinations) had a complication rate of 1.3/1,000 cases. Duodenoscopy with cannulation was performed 3,884 times and had a complication rate of 21.6/1,000 examinations. Diagnostic coloscopy (25,298 examinations) had a complication rate of 3.4/1,000. Polypectomies performed during coloscopy in 6,124 cases had a complication rate of 23.3/1,000 cases. Esophageal dilations (13,139 cases) had a complication rate of 4.25 with mercury bougies, and in 9,431 cases metal olives produced a complication rate of 6.1/1,000 treatments. Dilation for achalasia in 1,224 patients produced a complication rate of 18.4/1,000 procedures. Peritoneoscopy (4,404 examinations) produced a complication rate of 5.4/1,000 patients. The value of these diagnostic and therapeutic procedures is now well established, but must be weighed against a potential risk of complications.

5520 FOLIC ACID ABSORPTION IN VARIOUS GASTROINTESTINAL DISORDERS. (Eng.) Elsborg, L.; Bastrup-Madsen, P. (Univ. Dept. Medicine, Aarhus Amtssygehus, Aarhus C, Denmark). *Scand. J. Gastroenterol.* 11(3):333-335; 1976.

Since folate deficiency originating from malabsorption of folic acid has been previously demonstrated in some patients with gastrointestinal diseases, the folic acid absorption (TRIFA) test was carried out in 133 patients with various gastrointestinal diseases. The subjects ingested 200 μg of tritium-labeled folic acid, followed by an i.m. injection of 15 mg of nonlabeled folic acid. The amount of labeled folic acid was determined in urine collected for 24 hr. Folic acid malabsorption (i.e.,<30%) occurred in 7 of 18 patients with steatorrhea, in 14 of 59 patients with partial gastrectomy, in 1 of 7 patients with regional enteritis, and in 9 of 32 patients with small intestinal resection or short bowel syndrome following shunt operation for obesity. Nine patients with pernicious anemia (investigated after B_{12} treatment) and eight folate-depleted patients with hepatic cirrhosis had normal folate absorption. These results were compared with those of a previously reported series of 64 patients without gastrointestinal disease; folate malabsorption was present in only one, and this was only slightly below the lower normal limit. The results confirm those of other investigators, that malabsorption of folic acid occasionally occurs in gastrointestinal disorders. The TRIFA test is a simple, rapid, and reliable index of folate malabsorption.

5521 AZYGOGRAPHY IN THE RADIOLOGICAL STUDY OF MALIGNANT ESOPHAGEAL TUMORS. (Fre.) Humeau, F.; Gignoux, M.; Plombin, P.; Fourre, D.; Le Roquais, P.; Le Saint, J. N. (Centre Hospitalier Universitaire, Route Lion-sur-Mer, F 14000 Caen, France). *J. Radiol. Electrol.* 56(3):227-234; 1975.

Forty patients with esophageal cancer underwent azygography, by means of selective opacification following catheterization through the femoral vein. The azygos system was completely visualized 19 times. There were 2 failures, 2 normal, and 36 abnormal results. Complications were few and minimal (a phlebitis, a spontaneously regressed fever, a hematoma at the site of puncture, and an abscess at the site of puncture). Azygography can determine neoplasm spread and volume in the mediastinum and the involvement of other structures (right pulmonary artery). It distinguishes between involvement by deviation, compression, invasion, obstruction, and collateral circulation. Radiological and surgical data from 13/14 patients operated on following azygography indicate that this examination can predict difficulties in, or the impossibility of resecting the tumor, between the third and eighth thoracic vertebrae, and in cases of arch involvement, the need for a total esophagectomy with complementary cervical approach. This nontraumatic, simple, and rapid procedure appears to be most accurate in defining a tumor of the middle third of the esophagus; accuracy is less for lower third tumors.

5522 DIAGNOSIS OF BARRETT'S ESOPHAGUS BY PERTECHNETATE RADIONUCLIDE. (Eng.) Mangla, J. C.; Brown, M. (Monroe Community Hosp., 435 E. Henrietta Rd., Rochester, NY 14603). *Am. J. Dig. Dis.* 21(4):324-328; 1976.

The efficacy and safety of pertechnetate radionuclide in the diagnosis of Barrett's esophagus were investigated in four patients with confirmed disease and in six controls. The fasted patients were given ^{99m}technetium (^{99m}Tc; 5.0 mCi, i.v.) as the sodium pertechnetate, and scintigrams were made 20 and 40 min later. In five controls, the images showed a uniform uptake of ^{99m}Tc by the stomach, with a very clear delineation of the shape of the stomach. The minimal uptake in the region of the esophagus was actually in the mediastinal blood vascular pool. In one patient with Barrett's esophagus, the image was normal. This was the only patient who did not reveal the presence of either parietal or chief cells; the mucosa was lined with columnar epithelial cells only. The other three cases of Barrett's esophagus revealed a dense concentration of the isotope in the distal esophagus, extending cephalad to the outline of the stomach uptake. Although there was one false-negative result, the results clearly suggest that pertechnetate scintigraphy is a safe, rapid, atraumatic method for screening Barrett's esophagus. The test is performed in an average time of 90 sec/scintigraphy and a total patient time of 1 hr in the department.

5523 DIAGNOSIS OF PARTIAL GASTRIC DIVERTICULA. (Eng.) Treichel, J.; Gerstenberg, E.; Palme, G.; Klemm, T. (Klinikum Steqlitz der Freie Universitat Berlin, 1 Berlin 45, Hindenburgdamm 30, Germany). *Radiology* 119(1):13-18; 1976.

Five cases of partial (intramural) gastric diverticula observed in four patients and confirmed by endoscopy or operation are described. All diverticula were located on the greater curvature of the antrum. A round or oval pouch with a small neck and typical changes in shape and size represented the diagnostic radiographic features of partial diverticulum. Complete filling of the diverticulum by the injection of a spasmolytic (Buscopan) and the use of the double-contrast method proved to be important for the correct diagnosis in three patients.

5524 BARIUM FINDINGS IN RETROGRADE INTUSSUSCEPTION.

(Eng.) Nunez, D., Jr.; Bjarnason, T.; Schwartz, S. S. (Hosp. St. Raphael, New Haven, CT 06511). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(3):717-722; 1975.

Barium findings in four instances of retrograde intussusception are described, and illustrated in three case reports. In a 52-yr-old woman with terminal ovarian carcinoma, an upper gastrointestinal series revealed an intraesophageal mass that was clearly part of the stomach and an intraduodenal mass that was clearly a part of the jejunum. At autopsy, the retrograde intussusceptions were corroborated, and diffuse abdominal carcinomatosis was found. A hypaque enema examination of a 68-yr-old man revealed a sigmoidocolic intussusception. At operation, the retrograde intussusception was easily reduced, and an intraluminal tumor, histologically an adenomatous polyp, was palpated and resected. Plain roentgenograms of the abdomen revealed small bowel obstruction in a 98-yr-old man with a history of hemicolectomy for carcinoma. An internal hernia was found and reduced, but bowel obstruction recurred. Decompression was attempted by means of a Miller-Abbot tube. The tube arrested in the left midabdomen, and meglucamine diatrizoate was injected, demonstrating a retrograde jejuno-jejunal intussusception. At autopsy, a dilated bowel was found along the course of the tube, but not distal to its tip. These cases illustrate two principles of interpretation. When contrast material is administered orad to an antegrade or caudad to a retrograde intussusception, it must first enter the intussusceptum. When barium is administered orad to a retrograde or caudad to an antegrade intussusception, it must first enter the intussuscipiens.

5525 JEJUNAL MUCOSAL ABNORMALITIES IN PATIENTS WITH RECURRENT APHTHOUS ULCERATION.

(Eng.) Ferguson, R.; Basu, M. K.; Asquith, P.; Cooke, W. T. (Nottingham General Hosp., Nottingham, England). *Br. Med. J.* 1(6000):11-13; 1976.

Because there is a known association between oral ulceration, diarrhea, and weight loss, and because the incidence of recurrent aphthous ulceration is high in idiopathic steatorrhea and celiac disease, the jejunal mucosa of 33 patients with recurrent aphthous stomatitis was examined. Eight patients had biopsy specimens that revealed a flat mosaic appearance, compatible with celiac disease. Only three patients had completely normal biopsies. In the lamina propria, the plasma cell counts in the nonceliac patients with aphthous ulcers were significantly increased (mean=2,064 cells) in comparison with those of normal controls (1,050 cells). The counts were also significantly higher in the celiac group (7,020 cells) than in either normal controls or the patients with aphthous ulcers. The numbers of intraepithelial lymphocytes in the nonceliac group were raised (66 cells) compared with those in normal controls (53 cells). The celiac group had significantly more of these cells (113) than both normal controls and the nonceliac group. In the celiac group, both hemoglobin (12.0 g/dl) and folate (15 μg/l) were significantly lower compared with the nonceliac group (13.5 g/dl and 61 μg/l, resp.). In the celiac group, abdominal discomfort, diarrhea, flatulence, and lethargy occurred in 3%, 5%, 3%, and 7%, resp., while the corresponding symptoms occurred in 15%, 11%, 11%, and 12%, resp., of the nonceliac patients. The eight patients in the celiac group were treated for at least 9 months with a gluten-free diet; all had complete remission of symptoms, and the hematological and biochemical values were restored to normal. In all eight patients, the aphthous ulcers completely resolved and did not recur. If patients with a flat mucosa who respond to treatment with a gluten-free diet can be considered to have true celiac disease, there are probably many people with undiagnosed celiac disease. The results indicate the importance of performing jejunal biopsies in patients with recurrent aphthous ulceration.

5526 RADIOGRAPHIC AND ENDOSCOPIC FEATURES OF COLONIC ULCERS IN SYSTEMIC Lupus erythematosus.

(Eng.) Tsuchiya, M.; Okazaki, I.; Asakura, H.; Ohkubo, T. (Keio Univ. Sch. Medicine, 35, Shinanomachi, Shinjuku-Ku, Tokyo, Japan). *Am. J. Gastroenterol.* 64(4):277-285; 1975.

The radiographic and endoscopic features of colonic ulcers in a 29-yr-old woman with systemic *Lupus erythematosus* are described. The patient presented with tenderness of the palpable rigid pelvic colon. She had a 5-month history of loose, watery stools. The results of a physical examination were essentially normal. A barium enema showed multiple small ulcers in the rectal, sigmoid, and descending colon, with preservation of colonic length and haustral marking. The niches of these small ulcers in profile were "collar button" in appearance. Colonofiberscopy and proctoscopy revealed a diffuse, swollen, and cloudy mucosa covered with a yellowish exudate. There were multiple punched-out ulcers, variable in size and depth, and circular or elliptical in shape. A biopsy revealed scattered mucosal and submucosal involvement by nonspecific inflammation. Infiltrates included lymphocytes, plasma cells, and polymorphonuclear neutrophils. Selective angiography of the inferior mesenteric artery showed a slightly dilated rectal artery and the early appearance of dense venous drainage in the rectosigmoidal colon. Steroid and 6-mercaptopurine therapy was an effective treatment. These findings are compared with those of 21 similar cases reported previously. There were two types of intestinal involvement: a predominating vasculitis with resultant ulceration and perforation or bleeding from the bowel, usually associated with a clinical picture suggestive of systemic *Lupus erythematosus* or pathological findings of the usual type of nonspecific ulcerative or granulomatous colitis. Steroid therapy is effective in the treatment of both types.

5527 APPLICATION OF THE IMMUNOELECTROPHORESIS TEST FOR HYDATIDOSIS IN PATIENTS WITH A PRESUMPTIVE DIAGNOSIS OF THE DISEASE. (Eng.) Lopez-Lemes, M. H.; Varela-Diaz, V. M. (Laboratorio de Immunologia Parasitaria, Hospital de Clinicas, Facultad de Medicina, Montevideo, Uruguay). *Trop. Geogr. Med.* 27(3):301-304; 1975.

The immunoelectrophoresis (IEP) test for hydatidosis was modified to obtain results within 48 hr rather than in the standard 5-7 days. The sera of 62 patients with hydatidosis were tested. The slides were incubated for 48 hr, followed by treatment in a citrate solution (modified method). The sera were again tested after the same slides were washed and demineralized in distilled water and stained with Amido Schwartz. Forty-three of 51 sera taken preoperatively were positive by the standard test. In 22 of these, the diagnostic *Echinococcus granulosus* arc 5 was readily recognizable immediately following treatment with the citrate solution. Of the 11 sera taken postoperatively, 10 were positive after staining, and in 5 of these, the diagnostic arc was detected when the staining was eliminated. The results suggest that although the diagnostic arc may not be seen in unstained slides when weakly reactive sera are tested, the slides should be examined following the citrate treatment.

5528 NEW ANGIOTOMOGRAPHIC METHOD FOR THE EXAMINATION OF THE LIVER. ITS VALUE, LIMITS AND CURRENT INDICATIONS--EXPERIENCE WITH 150 CASES. (Fre.) Lamarque, J. L.; Senac, J. P.; Bruel, J. M.; Toulsa, A.; Nicolas, A. (Service Central de Radiodiagnostic, Cliniques St-Eloi, 34000 Montpellier, France). *Med. Chir. Dig.* 3(4):253-259; 1974.

One hundred and fifty angiotomographies of the liver were performed in patients with liver tumors and in normal subjects. In cases of malignant tumors, the tomography clearly showed arterial lesions and confirmed the integrity of one lobe when the other was invaded by metastases. Angiotomography allows topography of the previously unknown spatial arrangement of the segmental arteries of the liver. The extreme clarity and detail of the images permits improved diagnostic accuracy.

5529 GALLSTONE ILEUS: THE IMPORTANCE OF CONTRAST EXAMINATIONS IN THE ROENTGENOGRAPHIC DIAGNOSIS. (Eng.) Balthazar, E. J.; Schechter, L. S. (Metropolitan Hosp. Center, 1901 First Avenue, New York, NY 10029). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(2):374-379; 1975.

Experience with 12 elderly (average age, 74 yr) patients in whom contrast medium examinations were more helpful in the diagnosis of gallstone ileus than were plain, supine, and upright abdominal films is presented. Air in the biliary tree was visualized in the plain films of five patients. A faintly calcified, ectopically located gallstone was visualized in only three cases. The small bowel pattern was considered compatible with intestinal obstruction (i.e., dilated small bowel loops, air fluid levels on the upright film, and variable amounts of air within the colon) in six cases. On the basis of the plain abdominal examination, the preoperative diagnosis of gallstone ileus was suggested in only four cases. When examined retrospectively, the seven upper gastrointestinal contrast examinations performed had definite findings, which permitted a positive diagnosis. Four cases demonstrated that the barium-filled gallbladder was a diverticulum-like structure, adjacent to and filling from the first duodenal segment. In one case, a tubular structure representing a cholecystoduodenal fistulous tract was visualized, while in the remaining two cases the entire extrahepatic biliary tree filled with barium. It is concluded that the plain abdominal film may be inconclusive and misleading in cases of gallstone obstruction. Contrast examinations should be performed immediately in elderly patients suspected of small bowel obstruction, even when the scout abdominal film is unremarkable.

5530 INTRAVENOUS HEPATOSPLENOGRAPHY. EXPERIMENTAL EVALUATION OF A NEW CONTRAST MATERIAL. (Eng.) Vermess, M.; Adamson, R. H.; Doppman, J. L.; Rabson, A. S.; Herdt, J. R. (Clinical Center, Building 10, Room 6S211, Natl. Inst. Health, Bethesda, MD 20014). *Radiology* 119(1):31-37; 1976.

A new, lipoid-based experimental contrast material (AG 60-99) was infused i.v. into 29 rhesus monkeys in an effort to opacify the liver and spleen for a period of time that would allow the routine use of tomography and improve the diagnostic accuracy of the examination of these organs. Three animals received dextrose in saline and served as controls. Of the 29 list animals, 20 received one injection, 8 received two injections, and 1 received four injections; the doses were: 1 ml/kg (6 injections), 2 ml/kg (28 injections), 3 ml/kg (2 injections), and 4 ml/kg (4 injections). Satisfactory hepatosplenograms were obtained at 2 ml/kg or more in over 80% of the trials. The injections resulted in dense hepatosplenograms, preserving diagnostic quality for over 24 hr and enabling routine utilization of tomography. This technique demonstrated simulated hepatic masses as small as 5 mm in diameter, which had been implanted in the liver of one animal. Limited histopathologic and toxicity studies showed no serious or lasting toxic manifestations from AG 60-99, and none of the animals died from it. AG 60-99 is potentially useful in the radiographic detection of early metastatic or lymphomatous involvement of the liver and spleen.

5531 LIVER SCANS IN CYSTIC FIBROSIS. (Eng.) Goodchild, M. C.; Banks, A. J.; Drolc, Z.; Anderson, C. M. (Inst. Child Health, Univ. Birmingham, Birmingham B15 2TH, England). *Arch. Dis. Child.* 50(10):813-815; 1975.

The value of liver scans in detecting progressive biliary cirrhosis in cystic fibrosis (CF) was studied in 16 children (aged 7-18 yr) with CF, and the results were compared with those of liver function tests (serum total proteins and albumin, SGOT, SGPT, serum alkaline phosphatase, prothrombin index, WBC count, and platelet count). The liver scans were examined by four observers. Scanning was done 30 min after the i.v. administration of 1 mCi ^{113m}In in colloidal form. A Shwachman score, which gives a measure of the degree of illness in CF by taking into account general activity, physical findings, nutritional status, and chest x-ray appearances, was calculated for each patient. Taking a mean value for the four opinions on each scan, 78% of the scans were thought to be abnormal. No correlation was noted between the degree of abnormality shown by the scans and the ages of the patients or their Shwachman scores. Abnormal liver function tests occurred in only four patients (elevated alkaline phosphatase in 2; elevated SGPT in 1; elevated alkaline phosphatase, abnormal prothrombin index, and reduced platelet count in 1), suggesting that scintiscans can detect an abnormality at a stage when hepatic cell function is still apparently undisturbed. However, the scans did not show liver disease of an unsuspected severity, and they did not allow any modification in treatment. Since no correlations between scan appearances and the ages of the patients or their Shwachman scores were found, the procedure will probably not contribute substantially to the prognosis in CF.

5532 SIGNIFICANCE OF GAMMA-GLUTAMYL TRANSPEPTIDASE IN PANCREATIC AND HEPATOBILIARY PATHOLOGY. COMPARISON WITH THE ALKALINE PHOSPHATASES AND WITH 5'-NUCLEOTIDASE. (Fre.) Touboul, J. P.; Hecht, Y.; Feneant, M.; van Batten, R. (Laboratoire Central de Biochimie "A," Hopital St-Antoine, 184, rue du Faubourg St-Antoine, 75571 Paris Cedex 12, France). *Med. Chir. Dig.* 4(4):227-232; 1975.

Serum activity of gamma-glutamyl transpeptidase (γ-GT), alanine amino transferase (ALAT), alkaline phosphatases (ALP), and 5'-nucleotidase (5'-NT) was studied in 324 patients with pancreatopathies (11), viral hepatitis (31), chronic active hepatitis (4), cirrhosis (65), primary biliary cirrhosis (47), intrahepatic cholestasis (26), extrahepatic cholestasis (29), cancer of the liver (52), and various cancers without hepatic metastases (38). Results indicate that a rise in γ-GT is strongly indicative of a hepatobiliary disorder but cannot lead to a differential diagnosis. However, γ-GT behaves more like a cholestatic enzyme. Compared to ALP and 5'-NT, activity of γ-GT is more varied in hepatobiliary disorders and especially in cholestases. Like ALP and 5'-NT, it cannot differentiate between intra- and extrahepatic cholestasis. Serum levels are high in hepatic cancers, and may be indicative of hepatic metastases.

5533 USE OF CAERULEIN WITH SUBMAXIMAL DOSES OF SECRETIN AS A TEST OF PANCREATIC FUNCTION IN MAN. (Eng.) Ribet, A.; Tournut, R.; Duffaut, M.; Vaysse, N. (Groupe de Recherche de Pathologie Digestive, CHU Rangeuil L3, 31400 Toulouse, France). *Gut* 17(6):431-434; 1976.

To determine the optimal conditions for the use of cerulein in the diagnosis of pancreatic disease, the effect of increasing doses of cerulein on bicarbonate and enzyme (lipase, amylase, and chymotrypsin) secretion was studied in 110 normal controls and 32 patients with pancreatic disease. Fifteen patients had chronic pancreatitis, 13 had recently (within 3-5 weeks) had acute pancreatitis, and 4 had histologically proven pancreatic carcinoma. Thirty-one controls received a continuous infusion of secretin [0.5 clinical units (CU)/kg/hr, i.v.] plus two consecutive doses of cerulein (18, 37.5, 75, and 150 ng/kg/hr). Thirty controls received secretin (2 CU/kg/hr) alone for 1 hr. The rates of bicarbonate secretion equivalent to the response to 2 CU/kg/hr secretin were obtained with all doses of cerulein combined with a background dose of secretin. However, the enzyme-secretory response obtained with 75 ng/kg/hr cerulein was greater than the responses obtained with the two lower doses. Cerulein at 75 ng/kg/hr combined with 0.5 CU/kg/hr secretin was then tested as a stimulant of pancreatic secretion of both bicarbonate and enzymes in 45 controls and the 32 patients with pancreatic disease. The bicarbonate secretory response to secretin plus cerulein in the controls was greater than that in 12 of the patients with chronic pancreatitis, while there was almost complete overlap between the results obtained in controls and those in patients with acute pancreatitis and pancreatic cancer. The separation between chronic pancreatitis and the control group was similar for lipase and chymotrypsin; only two patients with chronic pancreatitis had results that overlapped with those from the controls. The overlap between the outputs of amylase of the two groups precluded the use of amylase secretion for diagnostic purposes. Although the pancreatic secretory response to a combination of cerulein and secretin cannot be used as the sole criterion in the diagnosis of pancreatic carcinoma, the combination of peptides is a safe, reliable, and inexpensive method of establishing the diagnosis of the pancreatic exocrine insufficiency caused by chronic pancreatitis.

5534 ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY IN FAMILIAL PANCREATITIS. (Eng.) Perrault, J.; Gross, J. B.; King, J. E. (Mayo Clinic, 200 First St. SW, Rochester, MN 55901). *Gastroenterology* 71(1):138-141; 1976.

The cases of a father and son in whom endoscopic retrograde cholangiopancreatography (ERCP) was useful in the diagnoses of pancreatitis, presumably of the hereditary type, are presented. In the 20-yr-old son, pancreatitis with calculi was initially diagnosed by roentgenographic and cholecystographic examinations, which revealed large calculi in the head and body of the pancreas. The subsequent demonstration by ERCP of large intraductal stones in the dilated main pancreatic duct provided more complete detail. ERCP was also of value in the 42-yr-old father, because no calculi were seen on the plain abdominal roentgenogram. The finding that the main pancreatic duct was dilated in the father confirmed the diagnosis of pancreatitis. The diagnosis was confirmed in the son at surgery; a side-to-side pancreatojejunostomy 9 cm in length was performed. The patient became asymptomatic, except for persistent steatorrhea, which was controlled by p.o. pancrelipase. A transient episode of weakness and diaphoresis, associated with a decrease in blood glucose to 57 mg/dl, was the only side effect of ERCP in the son, and this may have been related to reactive hypoglycemia after glucagon infusion. Phlebitis of the brachial vein, probably secondary to diazepam use, occurred in the father. The onset of attacks of epigastric pain in childhood in both cases, as well as the lack of gallstones or alcoholic excesses, suggested the possibility that the pancreatitis was of the heritable type. ERCP may be useful in the diagnosis of suspected pancreatitis.

5535 PERFUSION CHOLANGIOGRAPHY. (Fre.) Bismuth, V.; Chalut, J.; Diard, F.; Dijan, A.; Girard, J.; Lamarque, J. L.; Lautrou, J.; May, J. P.; Nahum, H.; Oury, F.; Triquet, O. (Hopital Ambroise-Pare, F92100 Boulogne, France). *J. Radiol. Electrol. Med. Nucl.* 56(8/9):581-589; 1975.

Two types of perfusion cholangiography are reviewed and discussed. Cholangiography with a perfusion of under 2 hr has replaced the rapid i.v. injection and has the same indications and contraindications. It allows simultaneous study of the gallbladder and of the common bile duct, a more constant opacification of the bile ducts, and greater safety. There is lack of agreement on optimal duration of the perfusion and when to block the sphincter of Oddi. A 12-hr-perfusion permits use of cholangiography in new indications, especially in the study of bile ducts in patients with jaundice or hepatic insufficiency. Although the gallbladder is better opacified than the common bile duct, a subsequent fatty meal will produce a good opacification of the latter. The lengthy perfusion presents inconveniences; and surveillance must be extremely strict to avoid complications and to ensure a uniform perfusion.

5536 PHLEBOGRAPHY OF THE PANCREATIC VEINS. (Eng.) Lunderquist, A.; Tylen, U. (Univ. Hosp., S-22185 Lund, Sweden). *Radiologe* 15(5):198-202; 1975.

Experience with transumbilical and percutaneous transhepatic catheterization of pancreatic veins is reported, and the normal venous anatomy, changes occurring in pancreatic carcinoma, and experience with cases in which this technique was combined with hormone assay are discussed. In carcinoma of the pancreas, the pancreatic veins show increased tortuosity and obliterations. Obliteration of a vein can sometimes be difficult to interpret, as the blood flow against the injection of contrast medium may prevent filling of venous branches; in these cases, other pancreatic venous branches must be injected. A large carcinoma may obliterate small veins, making them inaccessible to catheterization; in these cases, changes in the walls of large veins adjacent to the pancreas suggest the diagnosis. In one patient with Zollinger-Ellison syndrome in whom arteriography revealed a single large tumor in the head of the pancreas, transhepatic catheterization of the portal vein in combination with gastrin assay suggested that multiple tumors were present. High gastrin concentrations were found in all veins draining the pancreas, and at operation, insulomas were found in the head, body, and tail of the pancreas. Percutaneous transhepatic catheterization of the veins draining the pancreas, together with the discovery of high insulin concentrations in the anterior-superior pancreatic-duodenal vein and in the splenic and portal veins, suggested the diagnosis in another patient with a benign insulinoma. Percutaneous transhepatic catheterization of the veins in the portal system will presumably be of great value in the diagnosis and localization of endocrine tumors of the pancreas.

5537 EFFECT OF TOTAL GASTRECTOMY ON ACID PROTEOLYTIC ZYMOGENS IN SERUM AND URINE. (Eng.) Ishimori, A.; Sakurada, H.; Kawamura, T.; Hashimoto, H.; Yamagata, S.; Miura, Y.; Tsuda, K.; Yamagata, S. (Tohoku Univ. Sch. Medicine, 1-1 Seiryomachi, [980] Sendai, Japan). *Tohoku J. Exp. Med.* 118(1):45-51; 1976.

5538 ISOLATION OF MONOIODINATED GASTRIN USING DEAE-SEPHADEX AND ITS CHARACTERISTICS IN THE GASTRIN RADIOIMMUNOASSAY. (Eng.) Brown, T. R.; Bagchi, N.; Mack, R. E.; Booth, E.; Jones, D. P. (Hutzel Hosp. Medical Univ., Detroit, MI 48201). *Clin. Chim. Acta* 67(3):321-323; 1976.

5539 THE DIAGNOSIS OF GASTRIC CANCER USING A CATHETER-TYPE SEMICONDUCTOR RADIATION DETECTOR—COMPARISON OF DIAGNOSTIC VALUES OF β-EMITTING RADIONUCLIDE LABEL WITH γ-EMITTING LABEL. (Jpn.) Sassa, R.; Iwase, T.; Sugits, T.; Iio, M. (Inst. Adult Diseases, Asahi Life Foundation, Japan). *Jpn. J. Nucl. Med.* 12(3):255-260; 1975.

5540 MINIMAL THOROTRAST DEPOSITION IN PARA-PANCREATIC LYMPH NODES. (Eng.) Okuda, K.; Ichinohe, A.; Kono, K.; Ueda, S.; Noguchi, T.; Matsuura, Y.; Shimokawa, Y. (Dept. Medicine, Chiba Univ. Hosp., Chiba 280, Japan). *Radiology* 119(1):23-26; 1976.

5541 THE TRYPSIN INHIBITORY ACTIVITY OF PURE HUMAN PANCREATIC JUICE [Abstract]. (Eng.) Elias, E.; Southcott, J.; Marten, A.; Scott, J.; Summerfield, J. A. (Royal Free Hosp., Pond St., London NW3, England). *Gut* 17(5):385; 1976.

5542 ULTRASONIC DIAGNOSIS OF PANCREATIC CONDITIONS: A TENTATIVE RATIONAL APPROACH BASED ON THE ANALYSIS OF 260 CONTROL CASES WHICH WERE CHECKED (WITH REAL TIME AND DEGRADED INTENSITY SCALE). (Fre.) Weill, F.; Bourgoin, A.; Eisenscher, A.; Aucant, D. (Service Centrale de Radiodiagnostic, C.H.U., 25000 Besancon, France). *J. Radiol. Electrol.* 56(10):673-683; 1975.

5543 THE DIAGNOSTIC VALUE OF LIVER SCANNING: A RETROSPECTIVE STUDY. (Eng.) Andersen, H.; Pedersen, L.; Naundrup Svendsen, K.; Daugaard Peters, N.; Kilstrup, M.; Hess Thaysen, E. (Med. Dept. I., Aalborg Sygehys Nord, DK-1900 Aalborg, Denmark). *Scand. J. Gastroenterol.* 11(3):241-248; 1976.

5544 THE ROLE OF THE LIVER BIOPSY IN THE JAUNDICED PATIENT [Abstract]. (Eng.) Bhathal, P. S. (Dept. Pathology, Univ. Melbourne, Victoria, Australia). *Aust. N.Z. J. Med.* 5(6):594; 1975.

5545 COMBINED CHOLANGIOGRAPHY AND CHOLECYSTOGRAPHY USING SODIUM IOPANOATE [Abstract]. (Eng.) Koehler, R. E.; Goldberg, H. I. (Univ. California Medical Center, San Francisco, CA 94143). *Invest. Radiol.* 10(5):475; 1975.

5546 I. RELATED CONTEMPORARY METHODS FOR STUDIES OF HUMAN GASTROINTESTINAL FUNCTIONS—THEORETICAL AND METHODOLOGIC REMARKS. (Eng.) Johansson, C. (No affiliation given). *Mt. Sinai J. Med. NY* 43:1-8; 1976.

5547 MATHEMATICAL ANALYSIS OF INDICATOR CONCENTRATION-TIME CURVES OBTAINED IN SYSTEMS WITH CONSTANT OR VARYING MEAN TRANSIT TIMES. (Eng.) Lagerlof, H. O. (No affiliation given). *Mt. Sinai J. Med. NY* 43:9-20; 1976.

5548 III. MULTIPLE INDICATOR DILUTION METHOD. (Eng.) Johansson, C.; Ekelund, K.; Lagerlof, H. O. (No affiliation given). *Mt. Sinai J. Med. NY* 43:21-34; 1976.

5549 AN INVESTIGATIVE DUODENAL TUBE. (Eng.) Organ, C. H., Jr. (Creighton Univ. Sch. Medicine, 10th and Castelar, Omaha, NB 68108). *Am. J. Surg.* 13(5):645; 1976.

5550 DIAGNOSIS AND MANAGEMENT OF COLOVESICAL FISTULAS. (Eng.) Shatila, A. H.; Ackerman, N. B. (Veterans Admin. Hosp., Syracuse, NY). *Surg. Gynecol. Obstet.* 143(1):71-74; 1976.

5551 DIAGNOSIS OF MECKEL DIVERTICULUM BY SODIUM PERTECHNETATE Tc 99m SCAN. (Eng.) Cooper, M. (Walter Reed Army Medical Center, Washington, DC 20012). *JAMA* 235(14):1471-1472; 1976.

5552 THE ENTEROPOOLING ASSAY TO TEST FOR DIARRHEA DUE TO PROSTAGLANDINS [Abstract]. (Eng.) Robert, A.; Nezamis, J. E.; Hanchar, A. J.; Lancaster, C.; Klepper, M. S. (Upjohn Co., Kalamazoo, MI 49001). *Fed. Proc.* 35(3):457; 1976.

5553 GASTRIN PLASMA LEVELS IN HUMAN NEWBORNS [Abstract]. (Eng.) Delle Fave, G. F.; Kohn, A.; Bergonzi, L.; Melchiorri, P.; Torsoli, A. (2nd Dept. Internal Medicine, Policlinico Umberto I, Roma, Italy). *Acta Hepatogastroenterol. (Stuttg.)* 23(1):72-74; 1976.

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5555 RECENT ADVANCES IN ABDOMINAL ANGIOGRAPHY. (Eng.) Novelline, R. A.; Waltman, A. C.; Athanasoulis, C. A.; Baum, S. (Massachusetts General Hosp., Boston, MA). *Adv. Int. Med.* 21:417-449; 1976.

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5577 ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY. (Eng.) Paul, R. E., Jr. (New England Medical Center Hosp., 171 Harrison Ave., Boston, MA 02111). *Semin. Roentgenol.* 11(3):223-226; 1976.

See also, 5405, 5509, 5510, 5583, 5585, 5600, 5611, 5613, 5614, 5615, 5616, 5619, 5622, 5637, 5671, 5692, 5696, 5704, 5712, 5740, 5745, 5768, 5785, 5789, 5811, 5821, 5824, 5825, 5828, 5843, 5846, 5847, 5869, 5884, 5898, 5906, 5914, 5915, 5916, 5977, 5998, 6005, 6037, 6039, 6049, 6056, 6070, 6104.

GASTROINTESTINAL DISEASES

ESOPHAGUS

5578 FIBEROPTIC ENDOSCOPIC DIAGNOSIS AND TREATMENT OF A CONGENITAL ESOPHAGEAL DIAPHRAGM. (Eng.) Gilat, T.; Rozen, P. (Ichilov Hosp., Weizmann St., Tel Aviv, Israel). *Am. J. Dig. Dis.* 20(8):781-785; 1975.

The case of a 9-month-old girl in whom fiberoptic endoscopy was used in the diagnosis of a congenital esophageal diaphragm is presented. The infant had dysphagia to solids, and presented with esophageal bolus obstruction. Using an adult fiberoptic esophagoscope, a congenital web was found at the junction of the middle and distal thirds of the esophagus. Previous direct rigid esophagoscopy and roentgenologic examination had not visualized the web. The web was successfully ruptured and dilated by inserting a guide wire under fiberscopic control and then inserting metal olives, followed later by blind mercury bougienage. This case illustrates the use of adult fiberoptic instruments for the diagnosis and treatment of esophageal diaphragm in pediatric patients.

5579 EARLY CARCINOMA OF THE ESOPHAGUS. (Fre.) Marchat, F.; Lambert, R.; Moulinier, B.; (Hopital Edouard-Herriot, Place d'Arsonval, F 69374, Lyon Cedex 2, France). *Lyon Med.* 232(16):323-327; 1974.

Literature on early esophageal cancer is reviewed including survival data on selected cases. Early carcinoma is defined as infiltration of the mucosa and submucosa without invasion of muscle tissue or nodal spread and metastases. There are no characteristic clinical symptoms and, in fact, symptoms are often absent. Early symptoms might be slight difficulty in swallowing, sensation of a foreign body in the throat, retrosternal pain, spasm, etc. Esophageal study should precede medication. Diagnostic approach should begin with radiography followed by endoscopy (esophagoscopy and isotopic esophagoscopy) complemented by biopsy and blind biopsy. Surgery usually confirms the diagnosis. The over-all 5-yr survival rate of patients with esophageal cancer is under 10%. If detected in the early stages, the prognosis is more encouraging. In one series of 52 cases, 21 survived 2 yr or more; survival of 28 patients for more than 2 yr was reported in another series; and in a third series, one 4-yr survival with death from cervical neoplasm, five 4-yr survivals with death from other diseases, and 5-yr survival for 21/43 patients were reported.

5580 COLUMNAR CELL-LINED ESOPHAGUS: ASSESSMENT OF ETIOLOGY AND TREATMENT: A 22 YEAR EXPERIENCE. (Eng.) Borrie, J.; Goldwater, L. (Otago Medical Sch., Dunedin, New Zealand). *J. Thorac. Cardiovasc. Surg.* 71(6):825-834; 1976.

The clinical patterns, methods of management, and long-term results of treatment were studied in 45 patients with proven columnar-lined esophagus (CLE). Twenty-one patients were male and 24 female, with bimodal age ranges peaking in the decades 0-10 and 48-80 yr. Of the first decade patients, all boys, two were brothers. While 44 had dysphagia, one third also had iron-deficiency anemia. All had x-ray-proven sliding hiatal hernias, with esophageal stricturing at the squamous cell-columnar cell interface. In 43 cases, this area was 35 cm or less from the upper jaw. The epithelial histology showed simple, tubular, mucus-secreting glands in 45 cases, goblet cells in 7 cases, no goblet cells in 38 cases, and gastric-type epithelium with parietal cells in 19 cases. In two cases, CLE was rising up the esophagus from 35 to 30 cm in 3 yr and from 40 to 23 cm in 10 yr. No stricture became neoplastic. The clinical evidence supports the view that CLE has a double etiology: it is congenital in children, but acquired, akin to "intestinalization of the stomach," in adults with sliding hiatal hernias. In the latter instance, CLE occurs as an alternative endpoint to reflux esophagitis. All patients had initial stricture dilatation with biopsy. In 17, this was the sole treatment. In 16 cases, a later transthoracic herniorrhaphy was performed to reduce the hiatal hernia and prevent further stricturing. Fifteen patients had transmural strictures. For this group, the authors' experience with Roux-Y esophagogastrostomy and esophagojejunogastrostomy, with stricture excision, and also with mere bypass of the stricture is reported. For the young, after stricture excision, esophagojejunogastrostomy with pyloroplasty performed in the second decade is favored. In the elderly, especially after unsuccessful hiatal herniorrhaphy, esophagojejunogastrostomy with stricture bypass proved satisfactory 3 yr after the operation.

5581 LOCALIZED PROXIMAL ESOPHAGITIS SECONDARY TO ASCORBIC ACID INGESTION AND ESOPHAGEAL MOTOR DISORDER. (Eng.) Walta, D. C.; Giddens, J. D.; Johnson, L. F.; Kelley, J. L.; Waugh, D. F. (Tripler Army Medical Center, Honolulu, HI). *Gastroenterology* 70(5):766-769; 1976.

The case of a 24-yr-old woman with an esophageal motor disorder, who experienced localized proximal esophagitis after ingesting a 500-mg ascorbic acid tablet, is presented. The patient presented with retrosternal chest pain and odynophagia. Fiberoptic esophagoscopy performed 8 hr after the ascorbic acid ingestion showed esophagitis, manifested by erosions and exudate 26 cm from the incisor teeth in the region of the aortic arch. Biopsy showed a severely inflamed lamina propria. A subsequent esophageal manometric study showed a mean distal esophageal sphincter pressure of 29 mm Hg and discoordinate aperistaltic contractions. An animal model confirmed the caustic nature of ascorbic acid for esophageal mucosa. In one healthy dog and two cats, a modified Mallinckrodt catheter held a control calcium lactate tablet 6 cm orad from a 500-mg ascorbic acid tablet, which was placed at the junction of the middle and lower third of the esophagus. After 24 hr, the esophagi of all animals were similar to that of the patient. The epithelium in the region of tablet was infiltrated with polymorphonucleated leukocytes, with areas of epithelial ulceration and edema, and the lamina propria contained areas of necrosis. The aperistaltic contractions in the patient probably caused prolonged mucosal contact of the ascorbic acid tablet in the region of the aortic arch and permitted a low intensity caustic agent to cause esophagitis.

5582 EXPERIENCES WITH THE LINTON-NACHLAS AND THE SENGSTAKEN-BLAKEMORE TUBES FOR BLEEDING ESOPHAGEAL VARICES. (Eng.) Burcharth, F.; Malmstrom, J. (Gentofte Hosp., Copenhagen, Denmark). *Surg. Gynecol. Obstet.* 142(4):529-531; 1976.

A controlled clinical trial was carried out to compare the effectiveness of the Sengstaken-Blakemore tube with that of the Linton-Nachlas tube in the emergency treatment of esophageal varices. Twenty-eight patients who had a total of 42 bleeding episodes were included in the study. Nine patients had previously been treated with the Sengstaken-Blakemore tube, and the remaining patients had not previously been treated by balloon tamponade. If rebleeding occurred during the same admission in which a patient was being treated with one of the tubes, treatment with the opposite type of tube was instituted. Twenty-seven bleeding episodes were treated with the Sengstaken-Blakemore tube, with bleeding being controlled in 20, and 15 were treated with the Linton-Nachlas tube, with bleeding being controlled in 6. No significant difference was found between the two types of tubes ($0.05<p<0.1$). During 27 treatments with the Sengstaken-Blakemore tube, five patients experienced respiratory distress due to dislocation of the tube, which was easily treated by deflation of the balloon. During the 15 treatments with the Linton-Nachlas tube, complications were caused by inflation of the balloon erroneously placed in the distal part of the esophagus; this caused rupture of the esophagus in two patients, and both died despite thoracotomy and suture. The study was terminated after the death of the second patient. The results suggest that the use of the Sengstaken-Blakemore tube is preferable to that of the Linton-Nachlas tube, except in the rare instances in which a hiatal hernia renders the Sengstaken-Blakemore tube liable to displacement, or bleeding from fundic varices renders it ineffective.

5583 ENDOSCOPIC EXAMINATION OF THE ESOPHAGUS. (Dan.) Borgeskov, S.; Egedorf, J.; Kruse-Blinkenberg, H. (Bispebjerg hospital, Copenhagen, Denmark). *Ugeskr. Laeger* 137(46):2687-2689; 1975.

5584 THERAPY OF PEPTIC STENOSIS OF THE ESOPHAGUS IN CHILDHOOD. (Ger.) Burkhardt, K.; Bahners, W. (Klinik und Poliklinik fur Allgemeinchirurgie, Universitat Gottingen, Gosslerstr. 10, W. Germany). *Chirurg* 46(11):507-512; 1975.

5585 X-RAY DIAGNOSIS OF THE ESOPHAGUS: REPORT 1. DIFFUSE PARTICLE-LIKE SHADOW IN THE ESOPHAGUS. (Jpn.) Itai, Y.; Kogure, T.; Okuyama, Y.; Akiyama, H. (Medical Sch., Tokyo Univ., Tokyo, Japan). *Jpn. J. Clin. Radiol.* 20(13):1133-1139; 1975.

5586 CORRECTION OF LONG SEGMENT OESOPHAGEAL STENOSES BY A COLONIC PATCH. (Eng.) Hecker, W. Ch.; Hollmann, G. (Univ. Children's Clinic, Munich, Germany). *Prog. Pediatr. Surg.* 8:81-95; 1975.

5587 COLON INTERPOSITION FOR THE REPLACEMENT OF THE ESOPHAGUS IN CHILDREN. (Eng.) German, J. C.; Waterston, D. J. (Orange County Medical Center, 101 City Drive South, Orange, CA 92668). *J. Pediatr. Surg.* 11(2):227-234; 1976.

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5589 HORMONAL CONTROL OF ESOPHAGEAL FUNCTION. (Eng.) Snape, W. J., Jr.; Cohen, S. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Arch. Intern. Med.* 136(5):538-542; 1976.

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5591 DISORDERS OF PHARYNGEAL AND UPPER ESOPHAGEAL SPHINCTER MOTOR FUNCTION. (Eng.) Kilman, W. J.; Goyal, R. K. (Univ. Texas Health Science Center, 5323 Harry Hines Blvd., Dallas, TX 75235). *Arch. Intern. Med.* 136(5):592-601; 1976.

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5593 ACHALASIA AND DIFFUSE ESOPHAGEAL SPASM. (Eng.) Castell, D. O. (Natl. Naval Medical Center, Bethesda, MD 20014). *Arch. Intern. Med.* 136(5):571-579; 1976.

5594 ACHALASIA: ESOPHAGEAL DYSKINESIA. (Fre.) Besancon, F. (Hopital Broussais, 75014 Paris, France). *Rev. Med.* 16(31/32):2127-2136; 1975.

5595 ESOPHAGEAL ATRESIA, BRACHIOCEPHALIC ARTERIAL TRUNK AND TRACHEOMALACIA. (Fre.) Sauvegrain, J.; Bohu, D.; Lallemand, D. (Hopital des Enfants-Malades, 149, rue de Sevres, F 75730 Paris Cedex 15, France). *J. Radiol. Electrol. Med. Nucl.* 57(6/7)465-470; 1976.

5596 ESOPHAGEAL ATRESIA AND TRACHEOESOPHAGEAL FISTULA MALFORMATIONS. (Eng.) Ashcraft, K. W.; Holder, T. M. (Children's Mercy Hosp., 24th and Gilham Rd., Kansas City, MO). *Surg. Clin. North Am.* 56(2):299-315; 1976.

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5598 CONGENITAL H-TYPE TRACHEOESOPHAGEAL FISTULA COMPLICATED BY ACHALASIA IN AN ADULT: REPORT OF A CASE. (Eng.) Olivet, R. T.; Payne, W. S. (Mayo Graduate Sch. Medicine, Univ. Minnesota, Rochester, MN). *Mayo Clin. Proc.* 50(8):464-468; 1975.

5599 MALLORY-WEISS SYNDROME. (Ger.) Heldwein, W.; Zimmermann, W. (Innere Abt. Stiftsklinik Augustinum, 8 Munich 70, Am Stiftsbogen 74, W. Germany). *Fortschr. Med.* 93(26):1212-1215; 1975.

5600 THE CLINICAL INVESTIGATION OF RETROGRADE AZYGOGRAPHY IN ESOPHAGEAL CANCER. (Jpn.) Makino, M. (Sch. Medicine, Kagoshima Univ., Japan). *Nippon Acta Radiol.* 35(6):394-429; 1975.

5601 GUIDE TO THE DIAGNOSIS OF BENIGN ESOPHAGEAL DISORDERS. (Eng.) McNally, E. F. (State Univ., New York Downstate Medical Center, Brooklyn, NY). *Hosp. Med.* 12(6):6-7, 11-14; 1976.

5602 METASTATIC MALIGNANT MELANOMA OF THE ESOPHAGUS. (Eng.) Wood, C. B.; Wood, R. A. B. (Welsh National Sch. Medicine, Heath Park, Cardiff CF4 4XN, U.K.). *Am. J. Dig. Dis.* 20(8): 786-789; 1975.

5603 ADENOID CYSTIC CARCINOMA OF THE OESOPHAGUS. (Eng.) O'Sullivan, J. P.; Cockburn, J. S.; Drew, C. E. (St. George's Hosp., London, SW1, England). *Thorax* 30(4):476-480; 1975.

5604 GIANT ESOPHAGEAL LEIOMYOMA WITH SECONDARY MEGAESOPHAGUS. (Eng.) Barreiro, F.; Seco, J. L.; Molina, J.; Villamor, J. (La Paz Hosp., Planta 3^a, Av. Generalisimo 177, Madrid 34, Spain). *Surgery* 79(4):436-439; 1976.

5605 THE EPIDEMIOLOGY AND ETIOLOGY OF ESOPHAGEAL CANCER IN NORTH CHINA: A PRELIMINARY REPORT. (Eng.) Anonymous. (No affiliation given). *Chin. Med. J.* 1(3):167-183; 1975.

5606 VARICOID CARCINOMA OF THE ESOPHAGUS. (Fre.) Jouve, P.; Pin, G.; Mathieu, B.; Dalmas, J.; Burger, G. (Hopital Nord, F 13326 Marseille Cedex 3, France). *J. Radiol. Electrol. Med. Nucl.* 57(6/7)517-519; 1976.

5607 TUMORS OF THE ESOPHAGUS. (Fre.) Fontaine, J.-L. (No affiliation given). *Rev. Med.* 16(31/32)2121-2125; 1975.

5608 LOWER ESOPHAGEAL STENOSIS IN ASSOCIATION WITH TRACHEOBRONCHIAL REMNANTS. (Eng.) Ohkawa, H.; Takahashi, H.; Hoshino, Y.; Sato, H. (Second Surgical Dept. Sch. Medicine, Chiba Univ., Chiba, Japan). *J. Pediatr. Surg.* 10(4):453-457; 1975.

5609 A SIMPLIFIED, IMPROVED TECHNIQUE FOR THE COLLIS GASTROPLASTY FOR DILATABLE ESOPHAGEAL STRICTURES. (Eng.) Demos, N. J. (New Jersey Medical Sch., Newark, NJ). *Surg. Gynecol. Obstet.* 142(4):591-592; 1976.

5610 NEW MEASURES FOR BLEEDING OESOPHAGEAL VARICES. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 3(5981):450; 1975.

See also, 5404, 5519, 5521, 5522, 5624, 5647, 5674, 6008, 6052, 6122.

5611 ENDOSCOPIC INDUCTION OF THE ELECTROMYOGRAM FROM THE HUMAN GASTROINTESTINAL TRACT.

(Eng.) Akasaka, Y.; Niki, I.; Sugawara, K.; Kawai, K. (Dept. Internal Medicine, Gifu Coll. of Dentistry, Monzen-cho, Naka-cho, Inaba-Gun, Gifu-ken, Japan). *Endoscopy* 7(3):139-141; 1975.

A new method of obtaining electromyograms of gastric and duodenal peristaltic movements using endoscopy is presented. The endoscope is inserted into the stomach or duodenum, and an electrode is vertically pierced into the gastric or duodenal wall. The electromyograms were recorded from the stomach (pyloric ring, antrum, and the lower part of the body) in 6 healthy volunteers and from the duodenum (the bulb and the second portion) in 18 volunteers. In the stomach, the grouped spikes regularly appeared at the interval of 10-24 sec. The greatest amplitude of grouped spikes averaged 0.2 mV, and their duration averaged 3 sec. In the duodenum, the grouped spikes occurred regularly at an average interval of 6 sec. The greatest amplitude of grouped spikes averaged 0.1 mV, and their duration averaged 1.8 sec. When acetylcholine chloride (0.2 mg/kg) was injected i.m., the number and amplitude of the grouped spikes of the duodenum increased, and the average interval was shortened markedly. After the i.v. injection of scopolamine butylbromide (0.4 mg/kg), there was a marked decrease in the number and amplitude of the grouped spikes, and the average interval was prolonged. The qualities of these electromyograms are similar to those of the electromyograms taken by previously reported methods.

5612 SERUM PYRIDOXAL IN PATIENTS WITH GASTRIC PATHOLOGY.

(Eng.) Sanderson, C. R.; Davis, R. E. (Royal Perth Hosp., Wellington St., Perth, Western Australia). *Gut* 17(5):371-374; 1976.

Studies were carried out in 8 normal controls and in 60 patients with gastric diseases other than peptic ulcers to investigate whether a low serum pyridoxal value is unique to peptic ulceration or if it occurs in other types of gastric pathology. Serum pyridoxal values were also compared with folate values in these subjects. There were 25 men and 35 women, and their ages ranged between 41 and 89 yr (mean 64 yr). Sixteen patients had gastric carcinomas, 6 had benign polyps, 9 had superficial gastritis, 19 had atrophic gastritis, and gastric atrophy was present in 2 patients. Serum pyridoxal levels were below normal in 44 patients. Of 13 patients with a folate level below 2.5 µg/l, 12 had a serum pyridoxal level of 12 or less. However, in 26 patients with a serum pyridoxal level of this order, serum folate varied between 0.9 µg/l and 15.5 µg/l. Serum folate was normal in all eight controls, and pyridoxal was low in one. The results show that a low serum pyridoxal level is not restricted to patients with active gastric ulceration. Dietary insufficiency, malabsorption, increased utilization or excretion, or any combination of these factors, could be responsible for the low serum pyridoxal levels found in the majority of patients with gastric pathology.

5613 GASTRIC MORPHOLOGY AND SERUM GASTRIN LEVELS IN PERNICIOUS ANAEMIA.

(Eng.) Lewin, K. J.; Dowling, F.; Wright, J. P.; Taylor, K. B. (Dept. Pathology, Room L235, Stanford Univ. Medical Sch., Stanford, CA 94305). *Gut* 17(7):551-560; 1976.

The range of gastric mucosal appearances was studied in 18 confirmed and 3 suspected cases of chronic atrophic gastritis of the type associated with Addisonian pernicious anemia; it was examined in relation to changes in secretory functions in the gastric body and pyloric antrum and the presence of circulating gastric antibodies. Biopsies taken from the body of the stomach and pyloric antrum were examined for gastrin activity by radioimmunoassay. Fasting serum gastrin activities ranged from 100 to 4,000 pg/ml. Serum gastric antibodies were within the expected range. The biopsies showed an epithelium lined by columnar cells and occasional small papillary projections around gland orifices, but there were occasional small foci where the columnar epithelium was replaced by low cuboidal epithelium. The intensity of inflammation was greater in the body than in the pyloric antrum and was generally of moderately severe degree. Inflammatory cells were largely plasma cells and lymphocytes, but there were occasional eosinophils. Atrophy of the fundus was generally severe, while that of the pyloric antrum was mild to moderate. Metaplastic changes were almost universal in the fundus and consisted of small intestinal and pyloric epithelium. The histological changes showed minimal variation from one area of the gastric body to another in multiple biopsies and in repeat samples. Endocrine cells were noticeably increased in eight cases, but this was not consistently related to elevated gastrin levels. The results indicate that the changes in chronic gastritis with pernicious anemia generally involve the entire gastric mucosa, so a single biopsy can reflect the general state of the stomach mucosa, and that metaplastic changes are frequent, particularly in the pyloric antrum.

5614 PRIMARY GASTRIC CANDIDIASIS IN UNCOMPROMISED SUBJECTS.

(Eng.) Nelson, R. S.; Bruni, H. C.; Goldstein, H. M. (M. D. Anderson Hosp. and Tumor Inst., 6723 Bertner, Houston, TX 77025). *Gastrointest. Endosc.* 22(2):92-94; 1975.

Two cases of primary gastric candidiasis occurring in otherwise uncompromised patients are presented. The first patient, an 83-yr-old woman, had a history of diverticulitis, atrophic gastritis, and gastric ulcer. At diagnosis by gastroscopy and cytologic examination of the biopsy specimen, she was essentially healthy, and her only complaint was of epigastric distress. The second patient, a 56-yr-old woman, had had a gastric resection earlier and had had localized perfusion with phenylalanine mustard 4 yr previously; there was no evidence that either of these factors played a part in the infection. In both patients, the earliest changes in gastric moniliasis resembled those of elevation of the mucosa, with ulceration of the apices. In the first patient, p.o. mystatin was ineffective in eliminating the infection, resulting in wider dissemination of involvement and ulceration. A follow-up gastroscopy showed complete healing 1 month after treatment with amphotericin B (5 mg by infusion daily for 3 days followed by 10 mg daily for the next 3 days). In the second patient, the involvement was minimal and never progressed to ulceration after treatment with p.o. mystatin. The correlation of endoscopic and radiological findings was poor in the early stages of infection, and good during the later phase of ulceration. In both patients, the early lesions were never demonstrated by x-ray, although they were readily seen and biopsied at endoscopy. In the first patient, the radiologic and endoscopic findings were completely compatible during the ulcerative phase. At least two target or bull's eye lesions were noted. The radiographic findings appeared to demonstrate deeper ulceration than did endoscopy in this late phase, in which the ulcerations seem rather shallow. Early lesions will be more accurately diagnosed by gastroscopy, biopsy, and cytology.

5615 LACTOFERRIN DEFICIENCY OF GASTRIC JUICE IN CANCER OF THE STOMACH. (Eng.)

Ghetie, A.; Dejica, D.; Abrudan, O.; Diaconescu, S. (Dept. Internal Medicine, City Hosp., Piatra Neaml, Rumania). *Rev. Roum. Biochim.* 12(3):167-169; 1975.

The concentration of lactoferrin was studied in the gastric juice, tumoral tissues, and juxtatumoral gastric mucosa of 26 patients with gastric adenocarcinoma, in 2 patients with gastric ulcer, and 2 healthy subjects. Lactoferrin was not detected by electroimmunodiffusion in the gastric juice of the patients with cancer. It was present in both the gastric ulcer patients and the normal controls, although the concentration varied widely between these subjects. Immunohistological studies demonstrated that lactoferrin was also absent in tumor tissue. The fluorescence corresponding to lactoferrin in the samples taken from around the tumor site was marked, and was similar to that seen in gastric mucosa from the healthy subjects and from the gastric ulcer patients. The absence of lactoferrin in the gastric juice and tumor tissue of patients with gastric adenocarcinoma may be due to an inhibition of lactoferrin delivery from synthesizing sites, neutralization of lactoferrin in the gastric juice, or the inability of the techniques used to detect lactoferrin.

5616 LONG-TERM PROGNOSIS OF IDIOPATHIC GASTRIC EROSIONS. (Eng.)

Walk, L. (Radjurstigen 44, S-17172 Solna, Sweden). *Radiologe* 15(9):356-359; 1975.

The long-term prognosis of multiple gastric erosions (erosive gastritis) was studied in 58 patients who were followed roentgenologically for 10-17 yr. In the six patients aged 18-30 yr, the erosions that recurred were regular and diffusely spread in the antrum. In the remaining patients, who were over 30 yr, the erosions were often irregular in size and appearance, and solitary large erosions were found in five patients. Among 21 patients in whom erosions were seen at the end of the follow-up, erosions were diffusely spread in the antrum and in 12 patients, were arranged either in groups or rows. In two patients, diffuse swelling was present; three had nodular elevations; large erosions were seen in two; in one, a transverse fold in the distal antrum was seen; and a marked knob-like thickening of the antral folds, which had been present for 15 yr was seen in one. Twenty-seven of the 58 patients have been asymptomatic on an ulcer regimen. In the first year of follow-up, there were recurrences in two-thirds of cases. Partial gastric resection was performed in 19 cases. Of three cases in whom erosions were the only lesion, one has been operated upon for repeated bleeding and two for epigastric complaints. Dumping appeared in two patients.

5617 ACUTE GASTRIC MUCOSAL ULCEROGENESIS IS DEPENDENT ON THE CONCENTRATION OF BILE SALT.

(Eng.) Ritchie, W. P., Jr.; Shearburn, E. W., III (Univ. Virginia Medical Center, Charlottesville, VA 22901). *Surgery* 80(1):98-105; 1976.

Bile salt reflux was studied in 11 patients after surgery to determine whether the animal studies implicating bile salt reflux in the formation of stress ulcers are valid in humans. Nine patients refluxed bile salts in a mean intragastric concentration of 1.87 ± 0.24 mM (range: 0.34-4.88 mM), and the ulcerogenic potential of physiologic concentrations of bile salts was evaluated. Using vascularized, chambered canine gastric mucosa, groups of animals were studied during three consecutive 30-min periods. Animals in group A were subjected to the topical acid test (ATS) during all three test periods. Group B was given ATS during periods 1 and 2, and ATA plus vasopresin (VP; 0.1 U/kg/min, via the splenic artery) during the third period. Group C received ATS during the first period, ATS plus topical sodium taurocholate (TC; 1 mM) during the second period, and ATS, TC, and VP during the third period. Group D received ATS during the first period, ATS plus 2 TC during the second period, and ATS plus 2 TC plus VP during the third period. Finally, group E received ATS during the first period, ATS plus 5 TC during the second period, and ATS plus 5 TC plus VP during the third period. The net fluxes of H^+ and Na^+, the electrical potential difference (PD), aminopyrine clearance, and formation of lesions were evaluated. In nonischemic mucosa, bile salts produced no ulcers, but did produce a significant concentration-dependent increase in H^+ back-diffusion [$y=(-76.7 + 115.3x)$, $r=0.87$, $p=0.01$] and a fall in PD [$y=65.0 - 7.6x$, $r=0.96$, $p<0.01$], and a nonconcentration-dependent increase in mucosal blood flow. In ischemic mucosa, the combination of topical acid, topical bile salts, and mucosal ischemia was acutely ulcerogenic. The severity of mucosal injury was dependent on the concentration of bile salt ($y=0.108 + 1.53x$, $r=0.90$, $p<0.01$). The data indicate that acute mucosal damage occurs in the presence of physiologic concentrations of bile salt, i.e., those routinely found in the gastric contents of postoperative patients.

5618 SEPTIC COMPLICATIONS FOLLOWING GASTRIC SURGERY: RELATIONSHIP TO THE ENDOGENOUS GASTRIC MICROFLORA. (Eng.) Nichols, R. L.; Miller, B.; Smith, J. W. (Chicago Medical Sch., Downey, IL). *Surg. Clin. North Am.* 55(6):1367-1372; 1975.

The qualitative microflora isolated from both normal and pathologic stomachs, and its origin and regulatory factors are discussed. The gastric microflora of 43 patients who underwent elective or emergency abdominal surgery was studied. Ten patients had no gastric or duodenal pathology, while the other 33 had either chronic duodenal ulcer, obstructing or bleeding duodenal ulcer, or carcinoma. An 18-gauge needle with a 50-ml syringe was used to perform needle aspiration on the greater curvature of the stomach following surgical entry of the peritoneal cavity. In 22 patients with either a normal stomach or chronic duodenal ulcer, the inhibitory effect of gastric acid and normal motility were evident. Aerobic bacteria were isolated in only five of these patients, and anaerobic bacteria were isolated in two. In contrast, in the 21 patients with carcinoma, bleeding or obstructing duodenal ulcer, or gastric ulcer, the amount of microflora increased greatly. Aerobic bacterial growth was found in all of these patients, and anaerobic growth was discovered in 16. No wound infections occurred among the 12 patients treated for chronic duodenal ulcer; five infections occurred among the other 31 patients. Four of these were shown to have been caused by a microorganism isolated from the initial gastric aspirate. The reduction in gastric acid levels or the alteration in gastric motility in disease states appears to allow the endogenous microflora to persist and to become the source of postoperative wound infections following gastric resection.

5619 RADIOLOGIC FUNCTIONAL DIAGNOSIS OF THE STOMACH AND DUODENUM FOLLOWING VAGOTOMY AND PYLOROPLASTY. (Ger.) Gottschild, D.; Schulz, H.-G.; Albert, H. (Radiologische Klinik des Bereiches Medizin der Karl-Marx-Universitat, DDR-701 Leipzig, Liebigstr. 20, E. Germany). *Radiol. Diagn. (Berl.)* 16(3):339-344; 1975.

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See also, 5408, 5496, 5518, 5519, 5523, 5537, 5539, 5556, 5562, 5570, 5571, 5592, 5605, 5606, 5609, 5670, 5672, 5688, 5695, 5697, 5700, 5701, 5703, 5789, 5809, 5861, 5902, 6047, 6064, 6071, 6094, 6096, 6097, 6098.

STOMACH

Peptic Ulcers

5665 CLINICAL AND EXPERIMENTAL STUDIES ON THE INFLUENCE OF NEUROPLEGIC DRUGS ON GASTRIC SECRETION AND PEPTIC ULCERS. (Pol.) Moczurad, K. (Clinic General Cardiology, Inst. Internal Medicine, Acad. Medicine, Krakow, Poland). *Folia Med. Cracov.* 16(4):413-426; 1974.

The effect of neuroplegic drugs (fenactylcitrate and mepazine) on gastric secretion and on the development of peptic ulcers was studied in 16 male patients with duodenal ulcers, before and after vagotomy, in 60 healthy controls, and in 36 cats (1.8-2.5 kg). The gastric secretion in humans and in cats was stimulated by an i.v. infusion of histamine (20 μg/kg/hr) or pentagastrin (6 μg/kg/hr). Experimental peptic ulcers were induced in cats by an i.v. infusion of histamine (80 μg/kg/hr) or pentagastrin (16 μg/kg/hr). After treatment with fenactylcitrate (1.0 mg/kg) or mepazine (2.0 mg/kg), a statistically significant decrease of secreted HCl was observed in humans and cats; a less significant decrease of secreted HCl was observed in patients after surgical vagotomy and in cats with parasympathetically denervated Heidenhain pouches. The number and surface area of experimental peptic ulcers decreased considerably after drug treatment. This inhibitory effect of neuroplegic drugs on gastric secretion and on the development of peptic ulcers is attributed to the drugs' central action through the vagus nerve, as well as to the direct effect of the drugs on peripheral nerve endings and on the secretory cells of the gastric mucosa.

5666 EFFECT OF A HISTAMINE H_2-RECEPTOR ANTAGONIST AND AN ANTICHOLINERGIC ON GASTRIC ACID SECRETION IN MAN. (Eng.) Barbezat, G. O.; Bank, S. (Groote Schuur Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 50(22):849-853; 1976.

Because of the hypothesis that the parietal cell has separate receptors for histamine, acetylcholine, and gastrin, and that these receptors interact, the effect of blocking the histamine and acetylcholine receptor sites on gastric acid secretion was studied in six patients with duodenal ulcers. Following the collection of basal gastric secretions, pentagastrin (6 μg/kg/hr, i.v.) was infused for 1 hr, and the secretions were again collected. Pentagastrin was discontinued, and one of the following solutions was administered by nasogastric tube: tritiated metiamide (200 mg) in 100 ml of 0.03 M HCl, propantheline bromide (30 mg) in 100 ml of 0.03 M HCl containing ^{14}C-polyethylene glycol (PEG) as marker, or metiamide plus propantheline bromide in HCl containing PEG. All three treatments reduced basal and stimulated-volume output, acid concentration, and acid output. With metiamide, the mean decreases in basal and stimulated-volume outputs were 44.4% and 42.6%, resp.; in acid concentrations, 86.2% and 26.4%, resp.; and in acid outputs, 80.8% and 55.9%, resp. With propantheline, the decreases in basal and stimulated-volume outputs were 28.3% and 37.2%, resp.; in acid concentrations, 48.7% and 22.1%, resp.; and in acid outputs, 69.3% and 51.9%, resp. With the drug combination, the decreases in basal and stimulated-volume outputs were 68.2% and 60.6%, resp.; in acid concentration, 48.2% and 19.4%, resp.; and in acid output, 82.8% and 63.9%, resp. Although the combination of metiamide and propantheline produced a greater inhibition of volume, and consequently of acid output, than each of the drugs alone, only the inhibition of stimulated-volume secretion was significantly greater ($p<0.05$) with combination therapy. It is doubtful that there is any therapeutic advantage from the use of this drug combination in the conventional doses used in this study.

5667 ALTERED SERUM GASTRIN LEVELS IN ACHLORHYDRIC STATES. (Eng.) Turnipseed, W. D.; Keith, L. M., Jr. (Ohio State Univ. Hosp., 410 W. Tenth Ave., Columbus, OH 43210). *Am. J. Surg.* 131(2):175-177; 1976.

Studies were carried out in 15 patients with histamine-fast achlorhydria (6 with pernicious anemia and 9 with atrophic gastritis) to determine the effect of calcium and secretin infusion on serum gastrin concentrations in these patients and to confirm the relationship between altered gastric pH and hypergastrinemia in achlorhydric states. The gastric pH in the achlorhydric patients ranged from 6.0 to 8.1 (mean 7.1 ± 0.2), whereas mean pH in 15 control patients was 1.9 ± 0.1. The basal gastrin levels in the achlorhydric patients were significantly higher than in controls (891 pg/ml ± 282 versus 84 pg/ml ± 8). The basal gastrin levels in three achlorhydric patients with antral gastritis averaged 197 ± 19 pg/ml, whereas the levels in 10 achlorhydric patients without antral gastritis averaged 1,509 ± 426 pg/ml. In the absence of antral gastritis, the mean basal gastrin values were 1,825 ± 63 pg/ml in four patients with pernicious anemia and 1,192 ± 620 pg/ml in six patients with atrophic gastritis. When eight normal controls, three achlorhydric patients with pernicious anemia without antral gastritis, two achlorhydric patients with pernicious anemia and antral gastritis, one achlorhydric patient with atrophic gastritis without antral involvement, and two achlorhydric patients with atrophic gastritis and antral involvement were challenged with an i.v. calcium infusion (4 hr), there was a greater than 200% increase in gastrin levels in the three patients with pernicious anemia without antral gastritis. No response occurred in the other groups. The results indicate that severe basal hypergastrinemia is not confined to the Zollinger-Ellison syndrome, but frequently occurs in achlorhydric patients with pernicious anemia or atrophic gastritis. When the antrum is affected by gastritis, the gastrin levels are much lower; impairment of the acid inhibition reflex may play an important role in the mechanism. The dramatic response to calcium stimulation in patients with pernicious anemia also suggests the possibility that cells with endocrine-like autonomy may exist in the gastric mucosa, and that calcium infusion may be useful in confirming the diagnosis of pernicious anemia.

5668 A COMPARISON OF THE COURSE OF THE DISEASE AMONG PATIENTS WITH GASTRIC ULCER, DUODENAL ULCER, AND ULCER DYSPEPSIA WITHOUT ULCER DEMONSTRABLE BY X-RAY. (Eng.) Viskum, K. (Lungemedicinsk afdeling, Vejle sygehus, Kabbeltoft 25, 7100 Vejle, Denmark). *Dan. Med. Bull.* 23(3): 129-136; 1976.

Duodenal ulcer, gastric ulcer, and ulcer dyspepsia without ulcer demonstrable by x-ray were studied in 2,619 patients during 1938-1952, and 1,331 of these were followed up during 1970-1971. There was little difference in the age distribution between the sexes; ages 41-60 yr were over-represented, while ages 15-30 yr were under-represented. In all three ulcer groups, men were more frequently affected than women. Of the 2,619, 935 underwent surgery for ulcer and on an average of 5.5 yr after index admission. The peak incidence of surgery occurred in the fifth decade of life. The percentage of operations was highest for duodenal ulcer, followed by gastric ulcer and no ulcer. The percentages were higher for men than for women. The main cause for surgery was inability to work due to recurrent symptoms. After surgery, 115 patients had to be reoperated for various reasons; their distribution was not dependent on the indication for the first operation. The preferred first operation was the Billroth II resection. The most common cause for reoperation was the recurrence of pain or hemorrhage (47%). In comparable groups, men had ulcer perforation more frequently than women; it was also more frequent in those who had undergone surgery. Of patients with melena and/or hematemesis, there were no significant differences between men and women, operated and unoperated patients, or among the three ulcer groups. When the total number of admissions due to ulcer disease were tabulated in relation to the number of observation years, the indices of patients prior to surgery were significantly greater than for those not operated on for all three groups. The indices before surgery were significantly greater than those after surgery. Comparison of the course of disease in the three groups from admission to follow-up or death showed that the no ulcer group had a more benign course. Differences between the duodenal and gastric ulcer groups were smaller, however, and the gastric ulcer group had a higher number of patients with no symptoms after admission, fewer who had surgery, and more deaths from ulcer disease. The results indicate that the quantitative differences between the three groups with regard to age at onset, age at admission, and frequency of perforations are moderate, and do not support the idea that the three ulcer groups represent three separate entities.

5669 EVOLVEMENT OF A NEW TREATMENT FOR PERFORATED DUODENAL ULCER. (Eng.) Jordan, P. H., Jr.; Korompai, F. L. (Baylor Coll. Medicine, Houston, TX). *Surg. Gynecol. Obstet.* 142(3):391-395; 1976.

To test the hypothesis that vagotomy and drainage may be a more effective procedure in the therapy of perforated duodenal ulcer than vagotomy and hemigastrectomy, an 8-yr randomized, prospective study was performed on 157 patients. The condition of the patient dictated that 40 patients (those with complications or those with perforation of more than 24-hr duration) be treated by simple closure. In the remaining patients, vagotomy and drainage (55 patients) or vagotomy and hemigastrectomy (62 patients) were performed. These patients were observed postoperatively for an average of 4 yr. There was one operative death after vagotomy and hemigastrectomy and none after vagotomy and drainage. There were no instances of incapacitating diarrhea in either group, and the frequency of postoperative gastric complaints were essentially the same in both groups. The most common postoperative complaints were postprandial fullness, which occurred in 8 of 55 patients after vagotomy and hemigastrectomy, and epigastric distress of various types, including pain, which occurred in 13 of 49 patients after vagotomy and drainage. Mild diarrhea occurred occasionally in 5 of 49 patients after vagotomy and drainage and in 2 of 55 patients after vagotomy and hemigastrectomy. Reoperation was required in three patients after vagotomy and drainage and in one patient after vagotomy and hemigastrectomy. The anticipated advantage of decreased gastric complaints after vagotomy and drainage compared with their frequency after vagotomy and hemigastrectomy in the definitive treatment of perforated duodenal ulcer was not apparent. To provide protection against further ulcer disease, and, at the same time, reduce postoperative gastric sequelae, parietal cell vagotomy without drainage was performed and evaluated in 13 patients with perforated duodenal ulcer. The longest follow-up period for these patients was 2 yr. There was no diarrhea, dumping, or other significant gastric complaint. Gastric emptying was normal, and no ulcers have recurred. The results were excellent in 11 patients and good in 2. These early results suggest that parietal cell vagotomy without drainage may be a satisfactory compromise between the use of simple closure that does not protect patients against recurrent ulcer and the use of vagotomy and hemigastrectomy or vagotomy and drainage, which impose increased morbidity and death rates on those patients who might not have had further ulcer disease.

5670 CIMETIDINE IN THE TREATMENT OF ACTIVE DUODENAL AND PREPYLORIC ULCERS. (Eng.) Bodemar, G.; Walan, A. (Univ. Hosp., 581 85 Linkoping, Sweden). *Lancet* 2(7978):161-164; 1976.

To determine whether cimetidine decreases ulcer pain and promotes healing as well as metiamide, a double-blind trial was carried out in 44 patients with endoscopically confirmed duodenal (36) or prepyloric (8) ulcers. Thirty patients received 200 or 300 mg of cimetidine four times daily for 6 weeks; 14 patients received a placebo for the same period. At 3 weeks, 67% of the patients treated with cimetidine and 17% of those receiving placebo had endoscopically healed ulcers ($p<0.005$). At 6 weeks, all but three patients receiving cimetidine (90%) had healed ulcers, compared with 36% receiving placebo ($p<0.001$).

Twelve patients receiving the 200-mg dose had healed ulcers at 6 weeks, compared with 14 receiving the 300-mg dose. Those receiving cimetidine had less daytime and nocturnal pain than patients on placebo. The differences were statistically significant for daytime pain during 4 of the 6 weeks. The cimetidine-treated patients consumed significantly less antacids than placebo-treated patients, and these patients' overall assessments of their wellbeing were significantly better. All patients on cimetidine had a significant reduction ($p<0.0005$) of their basal and pentagastrin-stimulated acid secretion, but no reduction in acid secretion was measured in the group who received placebo. The results suggest that cimetidine may be effective in the treatment of duodenal ulcer, although controlled, long-term studies are necessary to determine its safety and long-term effectiveness.

5671 BLEEDING FROM EXCLUDED ULCERS OF THE DUODENAL STUMP. (Rus.) Olshanskyi, A. A. (Dnepropetrovsk Medical Inst., Dnepropetrovsk, USSR). *Khirurgiia (Mosk.)* (4):122-125; 1975.

The difficulties in the diagnosis and surgical treatment of bleeding, excluded ulcers of the duodenal stump are reviewed. Exclusion surgery (a partial resection of the stomach) is often performed as a substitute for radical surgery for bleeding ulcers, when the possibility of damage to the general biliary and pancreatic ducts by direct surgical intervention exists. Over a 10-yr period, 54 patients had postoperative bleeding from the stomach; 17 of these had had a resection of the stomach, 14 of which were of the exclusion type. Two case histories are presented. In one, a correct diagnosis was eventually made, but the patient died for lack of radical surgery to remove the bleeding ulcer. In the second case, correct diagnosis and radical surgery led to recovery. Because of the impossibility of direct x-ray and endoscopic examination, the diagnosis of bleeding, excluded ulcers is usually based on previous surgery for removal of a duodenal ulcer and the inability to confirm any other source of bleeding by x-ray. The author concludes that exclusion of the duodenal ulcer does not guarantee its cicatrization, that bleeding from ulcers remaining in the duodenum may recur, and that radical surgery is necessary to treat bleeding, excluded ulcers.

5672 THE EFFECT OF THE SIZE OF THE GASTRIC OUTLET ON GASTRIC EMPTYING AFTER VAGOTOMY FOR DUODENAL ULCER. (Eng.) George, W. D.; Cowley, D. J.; Royston, C. M.; Glass, H. I.; Spencer, J. (Univ. Hosp. South Manchester, Manchester, England). *Br. J. Surg.* 62(11):879-881; 1975.

To determine if pyloroplasty can reduce the size of the gastric outlet and lead to temporary retention of solids, gastric emptying of isotopically labeled solid meals was studied in 17 normal subjects and in 30 patients who had had an operation for chronic duodenal ulcer. Each patient had a vagotomy of the whole stomach, combined with either a Finney pyloroplasty to produce a large gastric outlet (16 patients) or a Heineke-Mikuliez pyloroplasty to produce a relatively small outlet (14 patients). At 10-22 days after operation, gastric emptying was equally and significantly slowed in both groups compared with the normal controls. This delay occurred regardless of whether the vagotomy was complete or incomplete. At 4-6 months after operation, emptying had returned to normal in the patients who had had a Finney pyloroplasty, but remained significantly slowed after Heineke-Mikuliez pyloroplasty. Mild symptoms of gastric stasis frequently occurred in both groups in the early postoperative period, but were rare 4-6 months after operation. There was no correlation between the incidence of these early symptoms of stasis and the size of the gastric outlet constructed. The construction of a large outlet pyloroplasty does not confer an advantage in gastric emptying over small outlet pyloroplasty.

5673 OPERATIVE MORTALITY AND POSTOPERATIVE MORBIDITY OF HIGHLY SELECTIVE VAGOTOMY. (Eng.) Johnston, D. (Bristol Royal Infirmary, Bristol, BS2 8HW, England). *Br. Med. J.* 4(5006): 545-547; 1975.

Because isolated case reports of highly selective vagotomies (HSVs) have described necrosis, peritonitis, and sometimes death as complications, a world-wide survey of the results of 5,539 HSVs performed electively for duodenal ulcer was carried out. The operative mortality was 0.3%. This was lower than that found in collected series after either vagotomy with drainage (0.8%) or gastric resection with or without vagotomy (>1%). Necrosis of the lesser curvature occurred in 10 patients (0.2%) after HSV and caused death in 5 (0.1%). This necrosis is probably ischemic in origin. Reperitonealization of the raw area on the lesser curvature and prompt laparotomy if the patient develops signs of peritonitis might lower the mortality still further. Three deaths were due to pulmonary embolism, one to mesenteric vascular occlusion, and four to myocardial infarction; such deaths might be reduced by the prophylactic use of low-dose heparin. Persisting gastric stasis requiring drainage occurred in only 0.1% of the patients in the early postoperative period and in 0.6% of the patients later; drainage procedures, which produce side effects such as early dumping, bilious vomiting, and diarrhea, could be abandoned if the mean incidence of recurrent ulceration after HSV remains close to its present level. HSV is probably the safest operation for duodenal ulcer because the alimentary tract is not opened and there is no anastomosis, suture line, or stoma.

5674 X-RAY DIAGNOSIS OF PEPTIC ULCER OF THE ESOPHAGUS. (Rus.) Arablinsky, V. M.; Shabelnaya, N. F. (Central Scientific Res. Inst. Gastroenterology, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):32-37; 1975.

5675 ERRORS IN THE DIAGNOSIS AND THERAPY OF PEPTIC ULCERS IN ANASTOMOSIS. (Rus.) Spivak, V. P.; Bondarenko, P. G. (Dnepropetrovsk Scientitic Res. Inst. Gastroenterology, Dnepropetrovsk, USSR). *Klin. Khir.* (5):58-59; 1976.

5676 CHARACTERISTICS OF THE ROENTGENOLOGICAL PICTURE OF ULCER DISEASE IN THE ELDERLY. (Rus.) Lukash, N. V.; Ryzhikov, V. A. (Crimean Medical Inst., Simferopol, USSR). *Vrach. Delo* (2):46-49; 1976.

5677 RATIONAL MANAGEMENT OF PEPTIC ULCER DISEASE. (Eng.) Borland, J. L. (Univ. Florida, Jacksonville Hosp. Educational Program, Jacksonville, FL). *Hosp. Prac.* 11(7):33-38; 1976.

5678 PATHOGENETIC AND PSYCHOLOGICAL PRINCIPLES OF THE TREATMENT OF GASTRIC AND DUODENAL ULCERS. (Fre.) Albot, G.; Weill, J. (8, rue des Saint-Peres, 75007 Paris, France). *Ann. Gastroenterol. Hepatol.* 12(1):1-32; 1976.

5679 DUODENAL ULCER. PSYCHOSOMATIC MANAGEMENT. (Por.) Pontes, J. F.; Castro, R. C. de; Dieter, K.; Dillner, G.; Maia, J. (Instituto Brasileiro de Estudos e Pesquisas de Gastroenterologia, Sao Paulo, Brazil). *Arq. Gastroenterol. (Sao Paulo)* 12(3):205-210; 1975.

5680 UPDATE ON PEPTIC ULCER THERAPY. (Eng.) Graham, D. Y. (Baylor Coll. Medicine, Houston, TX). *Consultant* 16(2):128-130; 1976.

5681 A LOOK AT CHANGING 'FASHIONS' IN PEPTIC ULCER SURGERY. (Eng.) Harrison, R. C. (Univ. British Columbia, British Columbia, Canada). *Consultant* 16(1):127-132; 1976.

5682 LIQUORICE PREPARATIONS IN THE TREATMENT OF PEPTIC ULCER. (Cze.) Ronsky, R. (Interni oddeleni fakultni polikliniky fakulty vseobecneho lekarstvi KU, 121 11 Prague 2, Karlovo nam. 32, Czechoslovakia). *Cesk. Gastroenterol.* 29(7):464-470; 1975.

5683 EFFECT OF DOCA (DEOXYCORTICOSTERONE ACETATE) ON THE FUNCTIONAL CONDITION OF CARDIOVASCULAR SYSTEM IN PATIENTS WITH ULCER DISEASE. (Rus.) Ivanova, E. A. (Kiev Medical Inst., Kiev, USSR). *Vrach. Delo* (10):89-93; 1975.

5684 EXPERIMENTAL BASIS FOR A NEW THERAPEUTICAL METHOD: "THE CHEMICAL SURGERY" OF DUODENAL ULCERS--GASTRIC MUCOSCLEROSIS. (Rum.) Mandache, Fl.; Ghergut, A.; Stratulat, L.; Popescu, G.; Ciocilteu, P.; Giuroiu, V.; Pahomeanu, M.; Calescu, M.; Frumuz, Fl.; Tarta, D. (Clinica de chirurgie, Spitalul Brincovenesc, Bucharest, Rumania). *Chirurgia (Bucur.)* 25(1):11-18; 1976.

5685 FACTORS IMPEDING THE HEALING OF GASTRIC AND DUODENAL ULCERS. (Pol.) Batko, B. (Oddz. Chorob Wewn. Szpitala Wojskowego, 44-100 Gliwice, ul. Olesnickiego, Poland). *Wiad. Lek.* 29 (8):683-687; 1976.

5686 UCLA CONFERENCE: A NEW LOOK AT PEPTIC ULCER. (Eng.) Grossman, M. I.; Guth, P. H.; Isenberg, J. I.; Passaro, E. P., Jr.; Roth, B. E.; Sturdevant, R. A. L.; Walsh, J. H. (Veterans Admin. Wadsworth Hosp., Los Angeles, CA). *Ann. Int. Med.* 84(1):57-67; 1976.

5687 RESPONSE TO JEJUNAL ACIDIFICATION IN PATIENTS WITH DUODENAL ULCER AND NORMAL SUBJECTS [Abstract]. (Eng.) Thjodleifsson, B.; Wormsley, K. G. (Ninewells Hosp., Univ. Dundee, Dundee, Scotland). *Gut* 16(10):829; 1975.

5688 THE EARLY EFFECT OF TRIMIPRAMINE (SURMONTIL) ON GASTRIC SECRETION IN MAN. (Eng.) Myren, J.; Berstad, A. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 10(8):869-874; 1975.

5689 SEASONAL VARIATION IN THE INCIDENCE OF PEPTIC ULCERA PREFORATIONS. (Eng.) Bodhe, Y. G.; Mokashi, R. Y. (Byramjee Jeejeebhoi Medical Coll., Sassoon General Hosp., Poona, India). *Int. J. Biometeor.* 19(2):85-92; 1975.

5690 CHARACTERISTICS OF THE COURSE OF DUODENAL ULCER IN CHILDREN WITH POSTBULBAR LOCALIZATION OF THE MUCOSAL DEFECT. (Rus.) Mazurin, A. V.; Prokopova, I. V.; Barchunova, N. N. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Vopr. Okhr. Materin. Det.* 20(12):5-8; 1975.

5691 PARIETAL DIGESTION IN PATIENTS WITH GASTRIC AND DUODENAL ULCER. (Rus.) Danovskii, L. V.; Radbil', O. S. (V. I. Lenin Kazan Inst. Postgraduate Training Physicians, Kazan, USSR). *Ter. Arkh.* 47(9):65-73; 1975.

5692 ENDOSCOPIC CHARACTERISTICS OF THE GASTRODUODENAL ZONE IN PEPTIC ULCER PATIENTS. (Rus.) Grigoriev, P. Ya.; Triiger, I. I.; Tarasov, D. I.; Yakovenko, E. P.; Ledoschuk, B. A. (Blagoveshchensk Medical Inst., Blagoveshchensk, USSR). *Sov. Med.* (2):101-105; 1976.

5693 GASTRIC MUCOUS SECRETION IN SUBJECTS WITH DUODENAL ULCER. (Fre.) Andre, F.; Descos, F.; Andre, C.; Lambert, R. (INSERM U-45, Hopital Edouard-Herriot, Pavillon H bis, F 69374 Lyon Cedex 2, France). *Arch. Fr. Mal. Appar. Dig.* 64(Suppl. 3): 233-237; 1975.

5694 ELECTROLYTE METABOLISM IN PEPTIC ULCER PATIENTS DURING ULTRASONIC TREATMENT. (Rus.) Ivancho, E. S.; Gmitrova, A. D. (Uzhgorod Univ., Uzhgorod, USSR). *Vrach. Delo* (10):93-96; 1975.

5695 HYPERGASTRINAEMIA IN A PEPTIC ULCER PATIENT WITH ANTRAL GASTRIN CELL HYPERPLASIA [Abstract]. (Eng.) Russell, R. C. G.; Bloom, S. R., Davies, W. A.; Polak, J. M.; Reed, P. I. (St. Mary's Hosp., London, W2 1NY, England). *Br. Med. J.* 4(5994):441; 1975.

5696 ELECTROGASTROGRAPHY IN PATIENTS WITH PEPTIC ULCER OF GASTRIC AND DUODENAL LOCATION. (Rus.) Vargaty, Ya. P. (Kiev Medical Inst., Kiev, USSR). *Vrach. Delo* (2):42-46; 1976.

5697 LETHALITY FOLLOWING GASTRIC RESECTION FOR GASTRODUODENAL ULCERS. (Rus.) Myshkin, K. I.; Skopets, M. D. (Saratov Medical Inst., Saratov, USSR). *Klin. Khir.* (10):13-17; 1975.

5698 PECULIARITIES OF THE CLINICAL PICTURE AND OUTCOMES OF SURGICAL TREATMENT OF PERFORATING ULCERS OF THE STOMACH AND DUODENUM IN PATIENTS OVER 50 YEARS OLD. (Rus.) Boitsov, N. I.; Bachev, I. I. (Ivanovo Medical Inst., Invanovo, USSR). *Klin. Med.* 54(2):47-51; 1976.

5699 THE LONG-TERM RESULTS OF A NEW METHOD OF SUTURE FOR PERFORATED GASTRODUODENAL ULCERS IN YOUNG PATIENTS. (Rus.) Tomashuk, I. P. (Kiev District Military Hosp., Kiev, USSR). *Klin. Khir.* (2):38-39; 1976.

5700 THE IMPORTANCE OF ORGAN-CONSERVING SURGERY IN PREVENTING THE DEVELOPMENT OF THE DUMPING SYNDROME IN PEPTIC ULCER PATIENTS. (Rus.) Sibul, U. F.; Truve, R. A. (No affiliation given). *Sov. Med.* (2):83-86; 1976.

5701 THE EFFECT OF VAGOTOMY WITH LIMITED GASTRIC RESECTION ON THE GASTRIN LEVEL IN THE BLOOD. (Rus.) Postolov, P. M.; Bassalyk, L. S. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Vestn. Khir.* 115(11):10-14; 1975.

5702 INTERIM RESULTS OF A PROSPECTIVE RANDOMIZED TRIAL OF HIGHLY SELECTIVE VAGOTOMY VERSUS A MORE PROXIMAL TYPE OF GASTRIC VAGOTOMY FOR DUODENAL ULCER: CLINICAL AND SECRETORY FINDINGS [Abstract]. Lyndon, P. J.; Johnston, D.; Greenall, M. J.; Bakran, A.; Goligher, J. C. (General Infirmary, Leeds 1, England). *Gut* 16(10):829; 1975.

5703 METABOLIC STUDIES AFTER BILROTH I GASTRECTOMY AND HIGHLY SELECTIVE VAGOTOMY FOR GASTRIC ULCER [Abstract]. (Eng.) Edwards, J. P.; Bakran, A.; Johnston, D. (General Infirmary, Leeds 1, England). *Gut* 16(10):829; 1975.

See also, 5408, 5517, 5549, 5657, 5662, 5664, 5687, 6094.

SMALL INTESTINE

5704 RADIOGRAPHICAL AND ENDOSCOPICAL STUDIES ON TWO CASES OF INTRALUMINAL DIVERTICULUM OF THE DUODENUM. (Eng.) Wobser, E. C.; Koischwitz, D.; Kutz, K.; Loffler, A.; Miederer, S. E. (Med. Poliklinik der Universitat Bonn, Wilhelmstrasse 35-37, 5300 Bonn, W. Germany). *Endoscopy* 8(2):101-105; 1976.

Two cases of intraluminal diverticulum of the duodenum are reported with radiographic and endoscopic findings. A 40-yr-old man had a 2-yr history of epigastric distress following heavy meals; he had a history of nausea. Barium meal examination showed the typical radiographic features of the condition, a pouch beginning at the ampulla of Vater and lying completely within the duodenum. Endoscopy showed a pouch attached to the medial wall of the duodenum narrowing the lumen to about one-fifth of its original size. The second case, a 25-yr-old man, had a 12-month history of nausea and discomfort after heavy meals. Barium meal examination showed an intraluminal diverticulum with some degree of dilatation in the upper part of the duodenum. The ampulla of Vater could not be seen endoscopically, possibly because it was either within or covered by the pouch. Although the roentgenographic appearance is diagnostic, it is stressed that endoscopy can give further information about hemorrhage, inflammation, and localization of the ampulla of Vater.

5705 IMMUNOCHEMICAL STUDIES OF THE ENDOCRINE CELLS OF THE GASTROINTESTINAL TRACT. II. AN IMMUNOPEROXIDE TECHNIQUE FOR THE LOCALIZATION OF SECRETIN-CONTAINING CELLS IN HUMAN DUODENUM. (Eng.) Robinson, G.; Dawson, I. (Dept. Pathology, Univ. Nottingham, Nottingham, England). *J. Clin. Pathol.* 28(8):631-635; 1975.

The localization and characterization of secretin-containing cells in the human duodenum by the application of immunoperoxidase techniques to carbodiimide-fixed tissue are described. The techniques were applied to sections of duodenal mucosa obtained from two patients with pancreatic carcinoma. The carbodiimide-fixed tissue was embedded in polyethylene glycol. Staining of sections by both the direct and indirect techniques clearly demonstrated the presence of secretin-containing cells. Labeled cells were localized mainly in the epithelium lining the lower portions of villi and upper regions of the crypts. The cells were predominantly pyramidal in shape, and the same cell was often in contact with both the basal lamina and lumen. The reaction product for peroxidase label was always localized in the basal half of the cell. Sections that were stained by a modified, indirect immunoperoxidase procedure and processed for electron microscopy contained granules giving a peroxidase reaction, but ultrastructural preservation was so poor that it was impossible to determine which particular cells contained the reaction product. Although fluorescein-conjugated antisera give excellent results at the light microscopic level, the use of peroxidase-conjugated antisera may be preferable, because the end result is visible in the light microscope as a brown black deposit; histological counterstains can be applied; and the same sections are available for preparing electron microscopic ultrathin sections that will show antiserum localization, since the end product is electron dense. The successful development of immunochemical staining techniques based on peroxidase-conjugated antisera will now allow a more direct comparison between conventional hematoxylin and eosin preparations and immunochemically stained slides of the same specimen.

5706 FOLATE CONTENT OF IRANIAN BREADS AND THE EFFECT OF THEIR FIBER CONTENT ON THE INTESTINAL ABSORPTION OF FOLIC ACID.

(Eng.) Russel, R. M.; Ismail-Beigi, F.; Reinhold, J. G. (Veterans Admin. Hosp., 3900 Loch Raven Blvd., Baltimore, MD 21218). *Am. J. Clin. Nutr.* 29(7):799-802; 1976.

To explain the relatively low incidence of folate deficiency in central Iran, the folic acid content of various Iranian breads was determined, since bread is the staple food in Iran. In addition, the effect of the fiber content of the bread on the intestinal absorption of folic acid was studied. Tanok, the village wholemeal bread, had an average "free" folate content (without conjugase incubation) of 0.34 μg/g. Sangak and Bazari, leavened breads made from flours of high extraction rates and widely consumed in towns and cities, had free folate contents of 0.38 and 0.71 μg/g, resp. The folate content of these breads was significantly higher than that of white bread from refined flour (0.13 μg/g) or oatmeal bread (0.09 μg/g). Iranian breads also had a high content of indigestible fiber (1.6-4.2% of dry weight). Sequential folate absorption tests (tritiated pteroylmonoglutamic acid; PGA) were performed in four subjects using meals of increasing fiber content and fasting. No interference with folate absorption was found. Furthermore, *in vitro* studies did not demonstrate the formation of insoluble complexes between bread fiber and folic acid, which might indicate decreased availability. The average dietary intake of folate from Iranian breads is more than the daily requirement of PGA required to prevent anemia, and approaches that needed in pregnancy.

5707 PRIMARY UPPER SMALL-INTESTINAL LYMPHOMA. A REPORT OF 40 CASES FROM IRAN.

(Eng.) Nasr, K.; Haghighi, P.; Bakhshandeh, K.; Abadi, P.; Lahimgarzadeh, A. (Nemazee Hosp., Shiraz, Iran). *Am. J. Dig. Dis.* 21(4):313-323; 1976.

Forty cases of primary upper small intestinal lymphoma (PUSIL) in Iran are described. All patients were from a single province, and were selected from patients with pathologically proven lymphoma of the gastrointestinal tract and the upper small intestine. All subjects were Moslems, and with two exceptions, were from the rural and low socioeconomic brackets. The disease was predominantly noted in males under 30 yr of age. Special features of PUSIL included edema, steatorrhea, and an associated abnormal heavy chain protein. Clubbing was noted in eight patients. Of 34 subjects, 28 had serum albumin levels below 3 g/100 ml. The edema, which was found in nearly 20%, appeared to be related to a hypoalbuminemia due to protein loss in the gastrointestinal tract. The frequency of giardiasis was over twice that noted in a similar, but apparently normal, population. Anemia with a low reticulocyte count was a common finding. In 37 patients examined by barium meal, the results were abnormal and suggested a malabsorption pattern. There was evidence of narrowing and dilation, segmentation, puddling, and abnormalities of the mucosal pattern. There was consistent agreement as to the histologic type of lymphoma between peroral biopsy (21 patients) and laparotomy (small bowel, 25 patients or mesenteric nodes, 11). Reticulum cell sarcoma and lymphosarcoma accounted for 37 of the 40 cases. Although the etiology of PUSIL has not been determined, geographical distribution, exposure to environmental factors early in life, and low protein intake are specific features of the disease.

5708 PRIMARY DUODENAL TUMORS: A DIAGNOSTIC AND THERAPEUTIC DILEMMA.

(Eng.) Kibbey, W. E.; Sirinek, K. R.; Pace, W. G.; Thomford, N. R. (Ohio State Univ. Coll. Medicine, 410 W. Tenth Ave., Columbus, OH 43210). *Arch. Surg.* 111(4):377-380; 1976.

Because the diagnosis of duodenal tumors is difficult, the case records of 32 patients with duodenal neoplasms were reviewed, and the case history of the most recent patient, a 51-yr-old man, is presented. Five years prior to the discovery of a duodenal tumor, the patient experienced melena; upper gastrointestinal roentgenograms showed a small lesion on the duodenal bulb, interpreted as an ulcer. Because of recurrent symptoms (anemia, nausea, abdominal pain, and melena), two upper gastrointestinal series were carried out over the next few years; both were interpreted as normal. Fiberoptic endoscopy revealed a 1-cm ulcerated mass located 14 cm past the pylorus. At surgery, two masses were found in the third and fourth portions of the duodenum; these portions and 10 cm of the proximal jejunum were resected, and an end-to-end duodenojejunostomy was established. Both tumors were leiomyomas, and the patient made an uneventful recovery. Of the 32 cases, 10 had a total of 11 benign tumors, and 19 had malignant tumors. Three patients had small, functional Zollinger-Ellison tumors. The average age of patients with benign tumors was 53 yr, and that of patients with malignant tumors was 59 yr. Eight patients with benign tumors were symptomatic, and in all cases the symptoms were related to gastrointestinal bleeding. Of the patients with malignant tumors, exclusive of the periampullary carcinomas (4 patients), all had duodenal obstruction, hemorrhage, a combination of the two, or in a single case, jaundice from extensive liver metastases. All patients with periampullary lesions were jaundiced. Patients with the Zollinger-Ellison tumors had long histories of peptic ulcer disease and none had symptoms referable to a duodenal mass lesion. Of 17 patients with malignant lesions who had barium studies of the duodenum, tumors were visualized in only 9. Many patients had had symptoms for extended periods of time, and most of these had at least one previously unsuccessful attempt at diagnosis. Benign tumors were removed successfully from 9 of 10 patients. By the time of diagnosis, only 12 of 19 malignant lesions were resectable; of the 14 patients who underwent resection, only 2 survived over 5 yr. All patients with Zollinger-Ellison tumors underwent extensive gastric resection and tumor removal, and all survived over 5 yr. The diagnosis and treatment of duodenal tumors are often delayed because the symptoms resemble those of more common diseases. The authors suggest that a more aggressive diagnostic approach, including fiberoptic endoscopy, be undertaken, whenever a patient has symptoms possibly referable to the duodenum.

5709 THE PROBLEMS AND CLINICAL ASPECTS OF PRIMARY MALIGNANT NEOPLASMS OF THE SMALL INTESTINE. (Ger.) Spelsberg, F.; Schmidtler, F. (Chirurgische Klinik der Universitat, D-8000 Munchen 2, Nussbaumstrasse 20, W. Germany). *Munch. Med. Wochenschr.* 117(18):771-776; 1975.

Experience with 6,432 patients with malignant tumors of the digestive tract, seen over a 20-yr period, is reviewed. Only 42 of these cases (0.66%) involved the small intestine, including the duodenum, but excluding tumors of the ileocecal region, peripapillary duodenal carcinomas, metastatic small intestinal tumors, and mesenteric tumors. The ages of the patients ranged from 20 to 82 yr, averaging 56.3 yr; there were 22 men and 20 women. An average of 116 days elapsed between the first visit to a physician and surgery. The tumors occurring in the the small intestine included 21 carcinomas, 15 sarcomas, and 6 carcinoids. All of the small intestinal epitheliomas were adenocarcinomas. The sarcomas included 9 leiomyosarcomas, 2 lymphosarcomas, 1 spindle cell sarcoma, 1 fibrosarcoma, 1 reticulosarcoma, and 1 neurogenic sarcoma. The ileum was the site of the largest number of tumors (25 cases), followed by the jejunum (11 cases), and the duodenum (6 cases). The most common symptoms were abdominal pain (present in 83% of the patients), weight loss (67%), and intestinal hemorrhage (62%). Preferred surgical treatment was radical resection, including the lymphatics. Laparotomy revealed inoperable tumors in five cases. Only palliative surgery was possible in 24 cases, and satisfactory tumor removal was possible in only 13 cases. Metastases had been detected prior to surgery in 34 patients; the lymph nodes, liver, peritoneum, and lung were the most common sites. The early (8-54 days after operation) mortality rate was 19%; no patients have died immediately after surgery since 1970. The 3-yr survival rate was 20.5%, and the 1-yr survival rate was 36%. The overall 5-yr survival rate was 12.2%, and in the patients in whom radical surgery was possible, it was 66%.

5710 STRUCTURAL AND FUNCTIONAL CHANGES IN THE SMALL INTESTINE DURING THE COURSE OF DERMATITIS HERPETIFORMIS. (Ger.) Kryszewski, A.; Zoltowska, A.; Pawlik, H. (I Klinik des Instituts fur Innere Medizin, Med. Akademie, Gdansk, Poland). *Hautarzt* 26(3):133-136; 1975.

Structural and functional changes in the small intestine were examined in 13 patients with dermatitis herpetiformis. Total villous atrophy was seen in small intestinal capsule biopsies from two cases. Definite structural alterations were seen in five additional cases. Inflammatory infiltrations in the lamina propria were present in all of the 10 biopsies examined. Gastrointestinal symptoms were not reported by any of the patients, perhaps due to the focal nature of the changes in the intestinal mucous membrane. Normal xylose absorption and normal serum vitamin B12 levels were seen in most of the cases. Only one patient demonstrated impaired xylose absorption, and two had low serum vitamin B12 levels. No correlation was apparent between the intensity of mucosal alterations and the impairment of absorption in dermatitis herpetiformis. The similarities between the mucous membrane alterations in dermatitis herpetiformis and those seen in gluten enteropathy (celiac disease) suggest that a gluten-free diet should be tried in the treatment of dermatitis herpetiformis, and that strict dietary control is also necessary in evaluating other forms of therapy.

5711 DIAGNOSTIC AND THERAPEUTIC PROBLEMS RAISED BY TWO CASES OF EXUDATIVE ENTEROPATHY. (Fre.) Frexinos, J.; Rumeau, J.-L.; Fortas, L.; Douchez, J.; Ribet, A. (Hopital Purpan, 31052 Toulouse Cedex, France). *Sem. Hop. Paris* 51(3):177-184; 1975.

Exudative enteropathy syndromes present diagnostic and therapeutic difficulties due to their varied etiology. The cases of two men (aged 38 and 61 yr) are reported. The enteropathy was characterized by edema of the legs, accompanied by a hypoproteinemia and a notable lymphopenia with disturbances in the polyvinyl-pyrolidone-^{131}I test. Lymphography showed major anomalies, with blockage in one case, and slowed lymphatic drainage with signs of dysplasia in the other. In one case, surgery revealed a calcified lymph node, probably of tubercular origin. The etiology of both cases appeared related to anomalies of the lymphatic system. A low-fat diet and the intake of medium-chain triglycerides produced significant improvement.

5712 DIVERTICULAR DISEASE OF THE TERMINAL ILEUM.

(Eng.) Bloch, C.; Bryk, D. (30 E. 60th St., New York, NY 10022). *Mt. Sinai J. Med. N.Y.* 43(2):122-128; 1976.

Four cases of diverticular disease of the terminal ileum are summarized, and the case history of one of the patients is presented. Three patients had no symptoms originating from the lower right quadrant, and the diagnosis was noticed incidentally during a small bowel series. Two of these patients had coexistent diverticulosis of the ascending colon. The presented case, a 51-yr-old woman, had intermittent right lower quadrant pain. Radiographic examination showed numerous outpouchings along the medial wall of the terminal ileum. At surgery, an inflammatory mass in the mesentery of the ileum and ascending colon was found; this had been suggested by the radiographic findings. An ileocolic resection was performed. The more frequent routine use of pressure spot films of the right lower quadrant in small bowel studies has increased the number of cases of diverticular disease of the terminal ileum described in the recent literature.

5713 CONGENITAL DUODENAL DIAPHRAGMS IN ADULTS: A DELAYED CAUSE OF INTESTINAL OBSTRUCTION.

(Eng.) Cooperman, A. M.; Adachi, M.; Rankin, G. B.; Sivak, M. (Cleveland Clinic, 9500 Euclid Ave., Cleveland, OH 44106). *Ann. Surg.* 182(6):739-742; 1975.

Three cases in which congenital duodenal diaphragms caused intestinal obstruction in the adult are presented, and the recent literature is reviewed. Two of the patients were women, and the ages of the patients ranged from 59 to 73 yr. The symptoms included recurrent epigastric pain and fullness, nausea and vomiting, and weight loss. In all cases, the need for surgery was indicated by an upper gastrointestinal series, which revealed a massively dilated stomach, with no progression of barium beyond the duodenal bulb in the first patient, a 2-cm narrowed segment in the descending duodenum of the second patient, and delayed gastric emptying with evidence of significant retention in the third patient. In all patients, the duodenal diaphragms were discovered at surgery, and treatment consisted of duodenotomy, excision of the web, and transverse closure of the duodenum in one layer. At least 35 similar cases have been reported. Membranous obstruction accounts for only 0.8-25% of all small intestinal obstructions and 2% of duodenal obstructions. In 75% of cases, the diaphragm is located near the ampulla, and the opening is usually eccentric rather than central. The diagnosis is most often made by upper gastrointestinal series, which reveals a dilated duodenal bulb and stomach proximal to the web and without evidence of pyloric ulceration.

5714 MUCOSAL LESIONS IN THE HUMAN SMALL INTESTINE IN SHOCK.

(Eng.) Haglund, U.; Hulten, L.; Ahren, C.; Lundgren, O. (Sahlgren's Hosp., Goteborg, Sweden). *Gut* 16(12):979-984; 1975.

Hemorrhagic lesions occurring in the small intestinal mucosa of seven patients, who underwent surgery for different gastrointestinal disorders, were examined histologically and compared with lesions found in the small intestine of the cat during a standardized simulated shock. The case histories of the seven patients, who ranged in age from 25 to 86 yr, are presented. In four patients, there was no evidence of occlusive vascular disease in the mesenteric vessels, but they had been hypotensive for varying lengths of time. The other three patients showed signs of occlusive vascular disease in the intestine, but no general arterial hypotension, and the segments resected for histological examination were taken from the borders of macroscopically normal intestine. All patients exhibited similar lesions, which ranged from grade I (i.e., the development of subepithelial space at the tip of the villus) to grade V (i.e., disintegration of the lamina propria, hemorrhage, and ulceration in the mucosa). Identical changes in villous histology were seen during shock in the cat and in the patients. In both cases, the lesions were strictly confined to the mucosa. It is proposed that an extravascular short-circuiting of oxygen in the mucosal countercurrent exchanger and an intravascular aggregation of blood cells might produce tissue hypoxia, which makes the mucosa vulnerable to enzymatic degradation.

5715 ALTERATIONS IN BODY COMPOSITION FOLLOWING INTESTINAL OBESITY.

(Eng.) Spanier, A. H.; Kurtz, R. S.; Shibata, H. R.; MacLean, L. D.; Shizgal, H. M. (Royal Victoria Hosp., 687 Pine Ave. W., Montreal, Quebec H3A 1A1, Canada). *Surgery* 80(2):171-177; 1976.

The efficacy of jejunoileal bypass surgery for obesity was assessed by measurements of body composition in 20 patients. The measurements were performed by multiple isotope dilution before and at 3- to 6-month intervals following jejunoileal bypass. Prior to bypass, the excess body weight was due primarily to body fat (BF), which accounted for 52% of the total weight. The nonfatty component of body composition, the lean body mass, although slightly increased in size over controls, was essentially normal. Two distinct patterns were observed following bypass. In 12 patients followed for 8.4 ± 1.5 months, there was a 21% decrease in body weight, resulting entirely from a loss of BF. The total exchangeable potassium and intracellular water volume, both measurements of the body cell mass (BCM), were unchanged. In eight patients followed for 13.9 ± 2.1 months, the mean body weight decreased by 27% or 38.8 kg, due to a 26.6-kg reduction in BF and a 13.0-kg decrease in the BCM. This was accompanied by a relative expansion of the extracellular mass. As a result, the mean Na_e/K_e ratio increased significantly ($p<0.05$) from a normal prebypass value of 0.95 ± 0.7 to 1.46 ± 0.11 following bypass. In 8 of the 20 patients, there was an undesirable loss of BCM with a relative expansion of extracellular supporting component of body composition, a pattern characteristic of malnutrition.

5716 COMPLICATIONS OF MECKEL'S DIVERTICULUM. (Eng.) Moore, T.; Johnston, A. O. B. (Royal Infirmary, Sheffield, England). *Br. J. Surg.* 63(6):453-454; 1976.

5717 POSTOPERATIVE ILEUS. MEASUREMENT OF INTRAGASTRIC PRESSURE VARIATIONS IMMEDIATELY AFTER ABDOMINAL OPERATIONS. (Fre.) Champault, G. (Hopital Cochin, Paris, France). *J. Chir. (Paris)* 109(4):409-428; 1975.

5718 GALLSTONE ILEUS: SEVEN PERSONAL OBSERVATIONS. (Ita.) Andretta, O.; Gervino, L.; Ciulli, A. (Chirurgia d'Urgenza, Universita di Firenze, Florence, Italy). *Osp. Ital. Chir.* 28(3/4): 203-216; 1975.

5719 DUODENAL OBSTRUCTION BY A GALLSTONE. (Fre.) Francois, M.; Huguier, M. (Hopital Rothschild, 43, boulevard de Picpus, 75012 Paris, France). *J. Chir. (Paris)* 109(4):473-476; 1975.

5720 POSTOPERATIVE ENTEROCUTANEOUS FISTULA OF THE SMALL INTESTINE: CRITICAL ANALYSIS OF 30 PATIENTS. (Ger.) Hollender, L. F.; Otteni, F.; Meyer, Chr., Starlinger, M. (3te Chirurgische Universitatsklinik, Centre Hospitalier Universitaire, Strasbourg F 67, France). *Langenbecks Arch. Chir.* 341(1):63-76; 1976.

5721 MECHANICAL SMALL BOWEL OBSTRUCTION CAUSED BY DISLOCATED FRACTURE OF THE LUMBAR SPINE IN A 9-YEAR-OLD CHILD. (Ger.) Hofmann, S. (Chirurgische Univ.-Klinik, Kinderchirurgie, 65 Mainz, Langenbeckstr. 1, Germany). *Z. Kinderchir.* 17(3): 271-277; 1975.

5722 IMPAIRMENT OF THE REGIONAL MESENTERIAL CIRCULATION AS A CAUSE OF FUNCTIONAL INTESTINAL OBSTRUCTION. (Rus.) Shal'kov, J. L.; Levendjuk, A. M.; Revin, V. M.; Nechitailo, P. E. (Kharkov Scientific Res. Inst. General and Emergency Surgery, Kharkov, USSR). *Vestn. Khir.* 116(4):55-60; 1976.

5723 BENIGN OBSTRUCTING PAPILLOMA OF THE AMPULLA OF VATER IN INFANCY. (Eng.) Shabot, M. M.; Asch, M. J.; Moore, T. C.; State, D. (Harbor General Hosp., 1000 W. Carson St., Torrance, CA 90509). *Surgery* 78(5):560-563; 1975.

5724 RESTORATION OF GASTROINTESTINAL MOTILITY IN PATIENTS WITH DIFFUSE PERITONITIS IN CONDITIONS OF HYPERBARIC OXYGENATION. (Rus.) Belokurov, Yu. N.; Medvedev, V. F. (Yaroslavl Medical Inst., Yaroslavl, USSR). *Klin. Khir.* (5):22-25; 1976.

5725 POSTOPERATIVE COMPLICATIONS AND MORTALITY IN ACUTE INTESTINAL OBSTRUCTION. (Rus.) Tishinskaya, Z. V. (Arkhangelsk Medical Inst., Arkhangelsk, USSR). *Vestn. Khir.* 116(5):45-48; 1976.

5726 TUBERCULOUS ILEOCOLITIS IN AN ADULT PATIENT WITH NONROTATION OF THE MIDGUT: REPORT OF A CASE. (Eng.) Mehta, M.; Polan, D.; Wujack, H. (Saint Barnabas Medical Center, Livingston, NJ 07039). *Dis. Colon Rectum* 19(4):366-371; 1976.

5727 ANATOMY OF THE COLON: GUIDE TO INTRA-ABDOMINAL PATHOLOGY. HICKEY LECTURE, 1975. (Eng.) Whalen, J. P. (Cornell Univ. Medical Coll., New York Hosp., New York, NY). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1):3-34; 1975.

5728 INTESTINAL ABSORPTION OF CALCIUM IN CHILDREN: COMPARATIVE STUDY OF CONTROLS AND CHILDREN WITH RICKETS. EFFECT OF 25-OH-D3. (Fre.) Dhondt, J.-L.; Farriaux, J.-P.; (Centre Hospitalier, 59000 Lille, France). *Ann. Pediatr.* 21(11):775-779; 1974.

5729 FECAL MATTER CONTENT OF THE ILEUM: MECHANISMS AND CONTROLS. (Fre.) Devroede, G. (Departement de Chirurgie, Centre Hospitalier Universitaire, Sherbrooke, Quebec, Canada J1H 5N4). *Biol. Gastroenterol.* 64(Suppl. 3):185-191; 1975.

5730 SUBTOTAL RESECTION OF THE SMALL INTESTINE IN THE NEWBORN. (Ger.) Exss, R.; Graewe, B.; Giffels, G.; Straaten, H. G. (Univ.-Kinderklinik, 53 Bonn, Adenauerallee 119, Germany). *Z. Kinderchir.* 16(4):399-405; 1975.

5731 THE SURGICAL THERAPY OF OBESITY: JEJUNO-ILEOSTOMY AS A CONTRIBUTION TO THE TREATMENT OF EXTREME OBESITY AND HYPERLIPIDEMIA. ANIMAL EXPERIMENTS AND CLINICAL STUDY. (Ger.) Husemann, B. (Chir. Univ.-Klinik, 852 Erlangen, Maximiliansplatz, W. Germany). *Fortschr. Med.* 93(29):1397-1402; 1975.

5732 UCLA CONFERENCE: INTESTINAL BYPASS OPERATION AS A TREATMENT FOR OBESITY. (Eng.) Bray, G.; Barry, R. E.; Benfidle, J. R.; Castelnuovo-Tedesco, P.; Drenick, E. J. (UCLA Sch. Medicine, Los Angeles, CA). *Ann. Intern. Med.* 85(1):97-109; 1976.

5733 COMPENSATORY PROCESSES AFTER EXTENSIVE ENTERECTOMIES IN CHILDREN. (Rus.) Ormantaev, K. S.; Akhanzaripov, Z. A. (Alma-Ata Medical Inst., Alma-Ata, USSR). *Vestn. Khir.* 116(4): 122-124; 1976.

5734 NONSURGICAL THERAPY OF SMALL INTESTINAL HEMORRHAGE. (Ger.) Schmutzler, R. (No affiliation given). *Thromb. Diath. Haemorrh.* (Suppl. 61):265-267; 1975.

5735 TRAUMATIC INTRAMURAL DUODENAL HEMATOMA WITH DUODENAL OCCLUSION AND PANCREATITIS. (Pol.) Letachowicz, E.; Piecuch, T.; Jaworski, R.; Matkowski, J. (Oddzial Chirurgii Ogolnej Szpitala Wojskowego, 50-981 Wroclaw, Poland). *Pol. Przegl. Chir.* 47(12):1581-1583; 1975.

5736 BENIGN TUMORS OF THE SMALL INTESTINE. (Pol.) Jackiewicz, Z.; Renkielski, K.; Anisimowicz, L. (I Klinika Chir. Ogolnej Instytutu Chirurgii AM, ul. Debinki 7, 80-211 Gdansk, Poland). *Wiad. Lek.* 28(15):1301-1304; 1975.

5737 CARCINOMA OF THE THIRD PART OF THE DUODENUM PRESENTING WITH ANEMIA. (Fre.) Cornet, A.; Debesse, B.; Barbier, J.-Ph.; Carnot, Fr. (Hopital Laennec, 75340 Paris Cedex 07, France). *Sem. Hop. Paris* 50(52/53):3167-3174; 1974.

5738 DUPLICATION OF THE DUODENUM, DUODENAL DIAPHRAGM OR INTERNAL DIVERTICULUM OF THE DUODENUM: REPORT OF A PERSONAL CASE. SURGICAL OPERATION, HISTOLOGY AND PATHOGENESIS. (Fre.) Cocheton, J.-J.; Poulet, J.; Boury, G.; Mathey, J.-C. (Hopital Tenon, 75970 Paris Cedex 20, France). *Sem. Hop. Paris* 50(47/48):2929-2934; 1974.

5739 DIGESTIVE LEIOMYOMAS: CASE REPORT OF MULTIPLE LEIOMYOMALOSIS IN THE SMALL INTESTINE. (Fre.) Rime, F. (49, rue Prevost-Martin, 1205 Geneve, Switzerland). *Praxis* 64(40):1275-1281; 1974.

5740 LEIOMYOMA OF MECKEL'S DIVERTICULUM REVEALED BY DIGESTIVE HEMORRHAGE. PREOPERATIVE DIAGNOSIS BY SELECTIVE ARTERIOGRAPHY. (Fre.) Parc, R.; Lichteinstein, H.; Chermet, J.; Bodin, F.; Malafosse, M. (Hopital Saint-Antoine, 184, faubourg Saint-Antoine, 75571 Paris, Cedex 12, France). *J. Chir. (Paris)* 109(4):613-620; 1975.

See also, 5475, 5476, 5519, 5524, 5529, 5551, 5556, 5570, 5574, 5610, 5619, 5621, 5623, 5625, 5626, 5628, 5629, 5643, 5646, 5650, 5653, 5655, 5656, 5657, 5662, 5690, 5742, 5761, 5808, 5831, 5832, 5834, 6013, 6043, 6045, 6060, 6064, 6071, 6089, 6095, 6098, 6105.

SMALL INTESTINE

Malabsorption

5741 REVERSIBLE ENTERITIS AND LYMPHOPENIA IN INFANTILE X-LINKED AGAMMAGLOBULINEMIA. (Eng.) Rhee, J. W.; Gryboski, J. D.; Sheahan, D. G.; Dolan, T. F., Jr.; Dwyer, J. M. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Am. J. Dig. Dis.* 20(11):1071-1075; 1975.

The case of a child with infantile X-linked agammaglobulinemia, who had severe diarrhea associated with intestinal villous atrophy and intramucosal bacteria without evidence of giardiasis or lactase deficiency, is presented. A diagnosis of X-linked agammaglobulinemia was made when the patient was 7 months old; monthly gamma globulin injections maintained his serum immunoglobulin G level between 200 and 270 mg%; it had previously been 43 mg%. At 17 months of age, the patient developed diarrhea, vomiting, and fever. A primary bacterial etiology of the diarrhea was supported by the presence of total villous atrophy and crypt elongation in the small bowel, the presence of mucosal inflammation with demonstrable intramucosal bacilli, and the absence of protozoal or parasitic infestation. On 12 attempts, a virus was never isolated from the stool, urine, cerebrospinal fluid, or nasopharyngeal washings. The presence of *Candida albicans* in the child's stool suggested a superimposed fungal infection, but the diarrhea continued after nystatin therapy. Responses to p.o. metronidazole, cholestyramine resin, or intrajejunal infusion of gamma globulin were also absent. Extreme peripheral lymphopenia was observed, with absolute lymphocyte counts ranging from 71 to 535/mm^3; differential lymphocyte analysis on three occasions revealed 11, 9, and 3% to be thymus-derived (T lymphocytes) and no detectable bone marrow-derived (B) lymphocytes. The child's lymphocyte count slowly returned to normal, as did the percentage of T lymphocytes (58%), following ampicillin therapy (250 mg, 4 times/day); clinical improvement was rapid, and the diarrhea was reduced within a week. This case illustrates the fact that a reverisbile enteritis in infantile X-linked agammaglobulinemia may be associated with factors other than giardia and intestinal mucosal enzyme deficiency. The enteritis responded most directly to antibiotic therapy, and bacterial enteritis should be considered in such patients showing poor response to other therapy.

5742 THE STRUCTURE AND FUNCTION OF THE SMALL INTESTINE IN DERMATITIS HERPETIFORMIS. (Pol.) Kryszewski, A. (I Clinic, Inst. Internal Diseases, Medical Acad., Gdansk, Poland). *Przegl. Dermatol.* 61(6):875-882; 1974.

Data suggesting similarities in the structure and function of the small intestine in dermatitis herpetiformis (DH) and in the malabsorption syndrome (gluten enteropathy) are reviewed. Experiments during the years 1966-1974 showed that the structural changes in the mucous membrane of the small intestine in DH, manifested by the dwindling of intestinal villi, are indistinguishable from the changes seen in the malabsorption syndrome. No such similarity has been observed for the function of the small intestine in the two diseases. The characteristic symptoms of the malabsorption syndrome (diarrhea; defective absorption of folic acid, xylose, glucose, and vitamin B_{12}; low levels of serum carotenes and immunoglobulin M; and splenic atrophy) do not always occur in DH. The most common symptom of DH shared by the malabsorption symdrome is poor folic acid absorption; the least common symptom is poor absorption of xylose, which is usually normal in DH patients, even if the mucous membrane of the small intestine shows profound morphological changes. A gluten-free diet in patients with DH or the malabsorption syndrome shows conflicting results, although the most recent studies indicate that the diet's effectiveness depends on its duration. Treatment with a gluten-free diet for an adequate length of time seems to be useful in the management of DH.

5743 BONE DEMINERALIZATION IN LACTOSE INTOLERANCE. (Fre.) Lebarbier, P.; Arlet, P.; Latorzeff, S.; Arlet, J. (Hotel-Dieu, 3152 Toulouse Cedex, France). *Rev. Med. Toulouse* 11(3):205-215; 1975.

Two cases (61-yr-old man and a 65-yr-old woman) of osteomalacia with a lactose intolerance are reported. In the first case, there was general demineralization with vertebral and pelvic fractures; calciuria was low (44, 34 mg/day) and alkaline phosphatases were high (92 IU). Urinary excretion of calcium was 50% of the injected dose. This patient had spontaneously eliminated milk and butter from her diet since the age of 13 because they provoked nausea and diarrhea. In the second case, there was also demineralization; alkaline phosphatases were 93 IU. calcemia 84-89 mg, and calciuria 50-100 mg. Iliac bone biopsy confirmed severe osteopenia with secondary malacia. The patient had been suffering from polyarthritis for 30 yr and had been receiving cortisone treatment for 6 yr. The patient's lactose intolerance may have contributed to the calcium malabsorption caused by the cortisone and thus have favored the development of the osteomalacia. Lactose intolerance seems to be an additional factor in decalcification (idiopathic osteoporosis and low calciuria osteomalacia). Its mechanism of action may be indirect (calcium deficit), direct (lactose deficiency), or lactose may only favor calcium absorption if both calcium and lactose are simultaneously present in the intestine.

5744 INTOLERANCE TO COW MILK PROTEINS IN CHILDREN. REVIEW OF 30 CASES. (Fre.) Deleze, G.; Nussle, D. (Institut de pharmacologie clinique de l'Universite de Berne, Murtenstrasse 35, CH-3010 Berne, Switzerland). *Helv. Paediatr. Acta.* 30(2): 135-149; 1975.

Thirty patients with intolerance to cow milk proteins were studied retrospectively, and 22/30 were followed for 3-14.5 yr. Intolerance usually begins in the first six months of life following a brief exposure to the proteins, but may appear later, especially after an intestinal infection. Symptomatology is predominantly digestive, frequently accompanied by respiratory, cutaneous, and general symptoms. In almost 50% of cases, there are signs of exudative enteropathy or generalized malabsorption with lesions of the jejunal mucosa. Protein intolerance must also be differentiated from lactose intolerance. The immediate evolution of protein intolerance is sometimes complicated by other alimentary intolerances, either immunological or secondary to lesions of the jejunal mucosa. There are three types of protein intolerance: acute anaphylactic (20%), chronic benign (43%, colitis), and severe chronic with intestinal malabsorption (37%), which is sometimes difficult to differentiate from celiac disease. Most often, the protein intolerance is transitory, disappearing between 2-2.5 yr of age. Long-term prognosis is good, as subsequent weight gain and height growth are normal, and rarely, is there residual allergic or digestive pathology.

5745 DIAGNOSIS AND TREATMENT OF INTESTINAL MALABSORPTION. (Fre.) Roge, J. (Hopital Broussais, 75014 Paris, France). *Rev. Med.* 16(35): 2363-2377; 1975.

5746 MEMBRANOUS DIGESTION AND MECHANISMS OF MALABSORPTION IN CHILDHOOD. (Rus.) Kliorin, A. I.; Ugolev, A. M. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vopr. Okhr. Materin. Det.* 21(5):31-36; 1976.

5747 ADULT CELIAC DISEASE (48 CASES). I. CLINICO-PATHOLOGICAL REPORT; RESPONSE TO THE GLUTEN-FREE DIET. (Fre.) Modigliani, R.; Matuchansky, C.; Galian, A.; Poupon, R.; Rambaud, J.-C.; Bernier, J. J. (Hopital Saint-Lazare, 107, rue du Faubourg-Saint-Denis, F 75010 Paris, France). *Arch. Fr. Mal. App. Dig.* 64:465-481; 1975.

5748 PRACTICAL CLINICAL STRATEGY OF THE TREATMENT AND FOLLOW-UP OF PATIENTS WITH CELIAC DISEASE. (Nor.) Bakken, A. F.

(Rikshospitalet, Barneklinikken, Oslo, Norway). *Tidsskr. Nor. Laegeforen.* 96(6):368-369; 1976.

5749 FOLIC ACID ABSORPTION IN TROPICAL ENTEROPATHY. (Ger.) Fleischer, N. K. F. (Medizinische Poliklinik, Universitat Wurzburg, Klinikstrasse 8, D-8700 Wurzburg, W. Germany). *Med. Klin.* 71(31):1273-1276; 1976.

5750 HEREDITARY FRUCTOSE INTOLERANCE. (Fre.) Bertrand, N. (Hopital Herold, 7, place Rhin-et-Danube 75935 Paris Cedex 19, France). *Rev. Pediatr. (Paris)* 11(5):235-240; 1975.

5751 COW MILK INTOLERANCE. (Rus.) Martynov, S. M.; Fedorenko, T. A. (Lvov Medical Inst., Lvov, USSR). *Vopr. Pitan.* (2):43-46; 1976.

5752 INDIVIDUAL SENSITIVITY TO LACTOSE IN LACTOSE MALABSORPTION. (Dan.) Gudmand-Hoyer, E.; Simony, K. (Kobenhavns amts sygehus i Gentofte, medicinsk afdeling B, Copenhagen, Denmark). *Ugeskr. Laeger* 137(36):2064-2068; 1975.

5753 INCIDENCE OF LACTOSE MALABSORPTION AMONG DANISH STUDENTS. (Dan.) Busk, H. E.; Dahlerup, B.; Lytzen, T.; Juul-Jorgensen, B.; Gudmand-Hoyer, E. (Kobenhavns amts sygehus i Gentofte, medicinsk afdeling B, Copenhagen, Denmark). *Ugeskr. Laeger* 137(36):2062-2064; 1975.

5754 HEREDITARY ACQUIRED LACTOSE MALABSORPTION. (Dan.) Gudmand-Hoyer, E.; Krasilnikoff, P. A. (Kobenhavns amts sygehus i Gentofte, medicinsk afdeling B, Gentofte, Denmark). *Ugeskr. Laeger* 137(34):1954-1955; 1975.

5755 HEREDITARY CONGENITAL LACTOSE MALABSORPTION. (Dan.) Krasilnikoff, P. A.; Gudmand-Hoyer, E. (Kobenhavns amts sygehus i Gentofte, borneafdeling L, Gentofte, Denmark). *Ugeskr. Laeger* 137(32):1830; 1975.

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5757 WHIPPLE'S DISEASE: REPORT OF A NEW CASE. (Spa.) Saez, L. R.; Gonzalez, J. L.; Miranda, M. A.; Vizan, A. A.; Zapatero, A. H.; Castrillo, J. M. (Ciudad Sanitaria "Nuestra Senora de Covadonga," Oviedo, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(3):359-372; 1976.

5758 SURGICAL MALABSORPTION. (Spa.) Monereo, J.; Canedo, M.; Dominguez, J.; Escobar, H.; Knapp, K.; Utrilla, J. G.; Almoyna, C. M.; Vazquez, C. (Clinica Infantil "La Paz," Universidad Autonoma, Madrid, Spain). *An. Esp. Pediatr.* 8(2):195-216; 1975.

5759 MALABSORPTION BY NEOPLASTIC BLIND LOOP OF THE COLON. (Spa.) De Quiros, J. B.; Guzman, E. P.; Carmona, A. M.; Sanchez, M. M.; Sanchez, A. L. (Servicio de Medicina Interna, Residencia Sanitaria Fernando Zamacola de la Sequridad Social, Cadiz, Spain). *Med. Clin. (Barcelona)* 63(6):306-308; 1974.

See also, 5520, 5525, 5703, 5711, 5732, 6066, 6067, 6068.

LARGE INTESTINE

5760 PROPHYLACTIC ORAL ANTIMICROBIAL AGENTS IN ELECTIVE COLONIC SURGERY: A CONTROLLED TRIAL. (Eng.) Goldring, J.; McNaught, W.; Scott, A.; Gillespie, G. (Victoria Infirmary, Glasgow S2, Scotland). *Lancet* 2(7943):997-1000; 1975.

The efficacy of prophylactic p.o. metronidazole specifically directed against anaerobic colonic microflora in combination with kanamycin to reduce the aerobic flora was evaluated in 50 patients undergoing elective colonic surgery. The patients received 200 mg of metronidazole and 1 g of kanamycin every 6 hr for 3 days before surgery, while 50 age- and sex-matched controls received dietary and mechanical preparation alone. The number of both aerobic (coliforms) and anaerobic (*Bacteroides*) microflora was significantly reduced in the treated patients (6 coliforms and 2 *Bacteroides*) in comparison to the controls (23 coliforms and 20 *Bacteroides*). There was a significant reduction in postoperative wound infection; 11 of 25 controls and only 2 of 25 treated patients developed a postoperative wound infection. Only three patients and all controls required systemic antibiotics in the first week after surgery. One control patient died from *Bacteroides* septicemia. No toxic or other side effects from this prophylactic regimen occurred during the study. This treatment seems valuable in suppressing both aerobic and anaerobic colonic microflora in patients undergoing colonic surgery.

5761 AGANGLIONOSIS OF THE ENTIRE BOWEL.

(Eng.) Talwalker, V. C. (J. J. Hosp., 394 Lamington Road, Bombay 400 004, India). *J. Pediatr. Surg.* 11(2):213-216; 1976.

The case reports of three infants with aganglionosis of the entire bowel (AEB), from a group of 50 infants with Hirschsprung's disease, are presented, and the literature concerning AEB is briefly reviewed. The first patient, a 4-day-old boy, had bile-stained vomitus and abdominal distension, but had passed meconium. At laparotomy, there was gross dilation of the jejunum for about 25 cm, starting 20 cm from the duodeno-jejunal flexure. Just proximal to the ileo-cecal junction, there was another segment of dilated intestine that was cyanic and showed a tear in the serosal surface and mesentery. This loop was resected, and an end-to-end anastomosis was performed. Histological examination of the biopsy specimens revealed no ganglion cells in the rectum, ileum, or jejunum. A few large cells with abundant cytoplasm suggestive of degenerating ganglion cells were noted. The rectum and ileum contained myenteric plexus nerve fiber, while in the jejunum, only sheath cells were observed in the myenteric plexus. In the other patients, a 36-hr-old boy and a 4-day-old boy, no meconium was passed. The obstruction in both cases was in the ileum, 30 or 40 cm from the ileo-cecal valve. Ganglion cells were absent from the duodeno-jejunal flexure to the rectum in both cases. In one patient, the meconium in the intestine was noted to be easily washed away (unlike meconium in meconium ileus), and the distal head of the meconium column was the same color as the rest of the column. All the infants died. AEB should be suspected in a neonate with intestinal obstruction if the obstruction is found at laparotomy to be at the level of the ileo-cecal region and there is no obvious discontinuity of the bowel.

5762 ASPECTS OF APPENDICEAL ABSCESS IN CHILDREN WITH SPECIAL REFERENCE TO DELAYED APPENDECTOMY.

(Eng.) Gierup, J.; Karpe, B. (Karolinska sjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 141(8):801-803; 1975.

To determine the value of delayed appendectomy following conservative management of appendiceal abscess, the risk of recurrence, the frequency of postoperative complications, and the risk of overlooking malignant disease were studied in 52 children. The treatment regime in all cases was conservative treatment initially (bed rest, broad spectrum antibiotics, and parenteral fluids when necessary), followed by delayed elective appendectomy. Ten patients had a recurrence a mean of 8 weeks after the initial attack, but before the appendectomy was performed. The appendix was immediately removed in seven of these patients, delayed appendectomy was performed in two, and in one, the appendix was left behind after draining the abscess. In the 37 patients without clinical recurrence, delayed appendectomy was performed after a mean of 9.5 weeks. In two patients, potentially malignant conditions were discovered at appendectomy. There were no significant postoperative complications. The results indicate that it is essential to perform delayed appendectomy in children with appendiceal abscess. This procedure is recommended after an interval of 4-6 weeks.

5763 INTUSSUSCEPTION OF THE APPENDIX IN CHILDREN.

(Eng.) Atkinson, G. O.; Gay, B. B., Jr.; Naffis, D. (Emory Univ. Sch. Medicine, Atlanta, GA 30322). *Am. J. Roentgenol.* 126(6):1164-1168; 1976.

Two pediatric cases of intussusception of the appendix are reported. Symptoms included cramping pain, vomiting, and diarrhea or constipation, but no blood in the stools. In the first patient, a 2.5-yr-old girl, a barium enema examination revealed an intussusception that could not be reduced. On repeat barium examination, ileocolic intussusception was reduced to the cecum where there was free reflux of barium into the terminal ileum. A lobular filling defect persisted in the base of the cecum, and no appendiceal filling was seen. At surgery, the mesoappendix was divided and ligated. After further inverting the base of the appendix into the cecum, the base was closed by encircling sutures. In the second patient, a 4.5-yr-old girl, abdominal roentgenograms revealed a soft tissue mass, suggesting an intussusception. At surgery, a partially inverted appendix was found, with several enlarged lymph nodes showing benign inflammatory change. A right hemicolectomy was performed with an end-to-end anastomosis between the distal ileum and ascending colon. A Meckel's diverticulum was also found and removed. Pathologically, there was focal ulceration and acute inflammation of the inverted appendiceal surface, lymphoid hyperplasia, and subacute inflammatory changes.

5764 THE CATHARTIC COLON: PATHOLOGICAL FINDINGS AND RADIOLOGICAL/PATHOLOGICAL CORRELATION.

(Eng.) Urso, F. P.; Urso, M. J.; Lee, C. H. (Akron City Hosp., Akron, OH). *Radiology* 116(3):557-560; 1975.

The case of a 42-yr-old woman with a cathartic colon is presented. The patient presented with recurrent urinary tract infection and occasional blood-streaked stools. A barium enema examination revealed reflux into the terminal ileum, a shortened colon, lack of haustra, an abnormal terminal ileum and colonic mucosa, and a 5-cm filling defect in the sigmoid, all suggesting long-standing ulcerative colitis and carcinoma. Sigmoidoscopy revealed edema and punctate ulcerations. At laparotomy, the small bowel was normal, except for a dilated and atonic distal ileum. The colon was dilated, atonic, and foreshortened. A subtotal colectomy was performed, and only 20 cm of ileum and 45 cm of colon were removed. Histologically, there was severe mucosal atrophy, suggesting that ulcerative colitis was unlikely. A single layer of tall columnar epithelial cells replaced the normal glandular pattern in some areas.

Exuberant crypt abscesses, seen in active ulcerative colitis, were absent. The mucosa and lamina propria were infiltrated by mononuclear cells. The distribution of the disease process in the resected colon and the absence of characteristic features of chronic ulcerative colitis led to a detailed medical history. The patient had constipation rather than diarrhea, and had an 18-yr history of habitual laxative use; she admitted taking two tablets of bisacodyl daily for 4 yr. Plain abdominal films taken 6 yr earlier revealed a dilated, air-filled cecum and loss of haustral markings. Unexplained hypokalemia and hypoalbuminemia had been noted on previous admissions; the authors believe that the albumin loss occurred through the colonic mucosa. Extreme mucosal atrophy should alert the pathologist to possible laxative abuse.

5765 PSEUDOMEMBRANOUS COLITIS TREATED WITH COMPLETELY DIVERTING ILEOSTOMY. (Eng.)

Saylor, J. L.; Andersen, C. B.; Tedesco, F. J. (Washington Univ. Sch. Medicine, 4960 Audubon Ave., St. Louis, MO 63110). *Arch. Surg.* 111(5):596-598; 1976.

The case of a 43-yr-old man in whom a completely diverting ileostomy was performed adjunct to the treatment for life-threatening pseudomembranous colitis is reported. The patient had been treated for 10 months for hypertension and progressive chronic renal failure secondary to glomerulosclerosis. He presented with diarrhea, hemoptysis, bilateral lobar pneumonia, and azotemia. He was treated with ampicillin for 10 days, receiving a total of 18.5 g. A biopsy specimen taken at sigmoidoscopy confirmed the diagnosis of pseudomembranous colitis. Despite treatment (hemodialysis every 48 hr, fluid and electrolyte therapy with central venous pressure monitoring, and vigorous albumin replacement), the patient's clinical condition deteriorated, with increasing ascites and generalized seizures. A completely diverting ileostomy was performed by transecting the ileum 12 cm from the ileocecal valve and oversewing the distal stump. On the first postoperative day, total parenteral hyperalimentation and daily hemodialysis were begun. By the second postoperative day, the severe diarrhea had dramatically stopped, and by the sixth postoperative day, albumin therapy was discontinued. Oral feeding was begun on the 14th day. Sigmoidoscopy on the 20th postoperative day showed resolution of the colitis. Three months later, sigmoidoscopy and a barium enema examination gave normal results. The ileostomy was closed, and continuity was reestablished with an end-to-end anastomosis. Both the mode of therapy and the coincident disease processes make this case particularly interesting. Early diverting ileostomy can be an important adjunct to the therapy of unusually severe cases of pseudomembranous colitis.

5766 PSEUDO-OBSTRUCTION OF THE COLON. (Eng.)

Spira, I. A.; Rodrigues, R.; Wolff, W. I. (Beth Israel Medical Center, 10 Nathan D. Perlman Pl., New York, NY 10003). *Am. J. Gastroenterol.* 65(5):397-408; 1976.

The literature on pseudo-obstruction of the colon is briefly reviewed, etiological factors are analyzed, and eight characteristic case histories are presented. The 212 cases reported in the literature were divided into 13 groups on the basis of suspected etiology. Of the total, 35% followed normal pregnancy or cesarian section. When other pelvic surgery and pelvic traumata were included, the figure approached 43%. Idiopathic cases accounted for 22%; intra-abdominal inflammation, 13%; cardiac failure and myocardial infarction, 8%; and retroperitoneal disease, 7%. Alcoholism has been reported as an important factor. It is postulated that pregnancy or uterine surgery interferes with parasympathetic outflow from sacral segments S2, S3, and S4, and disrupts the neurostimulatory balance between proximal (vagus-supplied) and distal colon and between parasympathetic and sympathetic nerve supplies to the distal colon. A functional obstruction would occur where proximal and distal nerve supplies overlap. Cardiac failure and myocardial infarction can cause vagal inhibition, resulting in a similar situation. Intra-abdominal inflammation, uremia, and lead poisoning may also in some way interfere with the sympathetic-parasympathetic balance or homeostasis of the proximal and distal parasympathetic supply. Early diagnosis is stressed. Emergency water-soluble contrast enemas should be instituted. Close monitoring of the patient's vital signs and regular examination of the abdomen are essential. Electrolyte balance should be checked regularly, and radiological evaluation should be performed to determine the degree of colonic distention. Treatment is usually decompression by a tube cecostomy. In cases of gangrene or extensive splitting of the *Taenia coli*, resection may be necessary. Barium enema and colonoscopy should be performed prior to discharge. The condition typically does not recur.

5767 COLONOSCOPIC PERFORATION: ITS EMERGENCY TREATMENT. (Eng.)

Jacobsohn, W. Z.; Levy, A. (Shaare-Zedek Hosp., 161 Jaffa St., P.O. Box 293, Jerusalem, 91-000, Israel). *Endoscopy* 8(1):15-17; 1976.

The case of a 60-yr-old woman in whom colonic perforation occurred during diagnostic colonoscopy is presented, and emergency treatment of this complication is described. The perforation occurred in an area of adhesions secondary to pelvic surgery. Immediately after the perforation, the patient entered into vascular collapse and respiratory distress, and the abdomen was distended. The introduction of a large bore i.v. catheter into the abdominal cavity with the release of the pneumoperitoneum resulted in an immediate return of vital signs. The patient subsequently underwent surgery and recovered. It is felt that this method of emergency treatment can be life-saving in a patient in whom perforation occurs during colonoscopy.

5768 COLONIC POLYPOID DISEASE: NEED FOR TOTAL COLONOSCOPY. (Eng.) Coller, J. A.; Corman, M. L.; Veidenheimer, M. C. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *Am. J. Surg.* 131(4):490-494; 1976.

The need for endoscopic evaluation of radiographically suspected benign colonic polyps was evaluated, and the need to examine the entire colon when a colonic polyp is encountered was studied. Colonoscopic examination of the entire colon was performed on 146 patients for radiographically suspected benign polypoid disease. Of 36 patients who did not have a neoplastic lesion at the suspected site, 7 had unsuspected small benign polypoid adenomas elsewhere in the colon. Of the remaining 110 patients, all of whom had a neoplastic lesion at the radiographically suspected site, 17 lesions were either adenocarcinomas or neoplastic polyps with invasive carcinoma. In 62 of the 110 patients, 128 additional unsuspected neoplastic polyps were found. Six of the additional neoplastic lesions were either adenocarcinomas or polyps with invasive carcinoma, and four of these malignant lesions were in patients who had a benign polyp at the radiographically suspected site. Suspected colonic polypoid disease should be evaluated colonoscopically, despite radiographic evidence of benignity. Colonoscopic evaluation in colonic polypoid disease should include examination of the entire colon with pathologic documentation of all polypoid lesions encountered.

5769 FIBRIN THROMBI, A CAUSE OF CLINDAMYCIN-ASSOCIATED COLITIS? (Eng.) Bogomoletz, W. V. (Queen Mary's Hosp., London, England). *Gut* 17(6):483-487; 1976.

Because fibrin thrombi have been previously found in necropsy material that included cases of ischemic and pseudomembranous enterocolitis, studies were carried out to verify the presence of fibrin thrombi in rectal biopsies of five patients with clindamycin-associated colitis. The clinical data of each patient are summarized; the bowel symptoms improved in all patients after the withdrawal of clindamycin. Fibrin microthrombi were identified in capillaries from all five patients. In the three biopsies that showed pseudomembranous colitis, fibrin thrombi were seen at random in capillaries lying directly below the pseudomembranes and in capillaries situated in the deeper and adjacent portions of the mucosa. In the two specimens showing nonspecific colitis (without pseudomembranes and without mucosal necrosis), fibrin thrombi were found only in the superficial capillaries. Many other capillaries showed only severe congestion. The identification of capillary thrombi with Lendrum MSB was more effective than with sections stained with hematoxylin-eosin. These findings indicate that fibrin thrombi in capillaries are probably more common in rectal biopsies from cases of clindamycin-associated colitis than would appear from the literature. It is possible that capillary thrombosis is the initial cause of the colitis, and that clindamycin has only, if any, a secondary effect on an already damaged and ischemic mucosa.

5770 REOPERATION OF THE LARGE INTESTINE. (Ger.) Holder, E. (I. Chirurg. Klinik der Stadt. Krankenanstalten, D-8500 Nurnberg, Flurstr. 17, W. Germany). *Chirurg* 47(1):8-15; 1976.

5771 POSTOPERATIVE PERIOD FOLLOWING TOTAL COLECTOMY. (Spa.) Arguelles, A. G.; Royo, M.; Charlo, T. (Ciudad Sanitaria "Virgen del Rocio," Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(3):337-346; 1976.

5772 MODERN THERAPY OF COLONIC DISEASES. (Ita.) Ottenjann, R. (I. Medizinische Abteilung, Stadtisches Krankenhaus Neuperlach, 8 Munich 83, Oskar-Maria-Graf-Ring 51, W. Germany). *Minerva Med.* 66(63):3286-3290; 1975.

5773 PROTEIN PATTERN OF MECONIUM AND STOOL IN CF PATIENTS AND CONTROLS. (Fre.) Pecau, Y.; Feigelson, J. (Laboratoire de Biologie Medicale, 41, rue Navier, F 75017 Paris, France). *Biol. Gastroenterol. (Paris)* 64(5):193-206; 1975.

5774 THE IMPORTANCE OF THE MUSCULUS CANALIS ANI FOR CONTINENCE AND ANORECTAL DISEASES. (Ger.) Hansen, H. H. (Zentrum der Chirurgie, Universitat Frankfurt/M., Theodor-Stern-Kai 7, D-6000 Frankfurt/M., W. Germany). *Langenbecks Arch. Chir.* 341(1):23-37; 1976.

5775 REFINED CARBOHYDRATE, SMOOTH-MUSCLE SPASM AND DISEASE OF THE COLON. (Eng.) Grimes, D. S. (Withington Hosp., Manchester 20 8LR, England). *Lancet* 1(7956):395-397; 1976.

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5811 ROUTINE DOUBLE-CONTRAST RADIOGRAPHY FOR THE DETECTION OF COLONIC POLYPS. (Fre.) Marti, R.; Descombes, P.; Delamarre, J.; Dupas, J.-L.; Capron, J.-P.; Trinez, G. (Centre Hospitalier Universitaire 1, place Victor-Pauchet, F 80030 Amiens, France). *Arch. Fr. Mal. Appar. Dig.* 65(3):197-200; 1976.

5812 MIXED JUVENILE AND ADENOMATOUS POLYPOSIS OF THE COLON. (Fre.) Barge, J.; Desvignes, G.; Maillard, J.-N.; Potet, F. (No affiliation given). *Arch. Fr. Mal. Appar. Dig.* 64(8):707-708; 1975.

5813 HEALING PROCESS OF COLONIC ANASTOMOSIS AFTER CONTAMINATION WITH *Staphylococcus aureus*. ANIMAL EXPERIMENTAL STUDIES ON SINGLE- AND DOUBLE-LAYER SUTURES. (Ger.) Langer, S.; Haberland, R.; Breining, H. (Abteilung Chirurgie, Medizinischen Fakultat, Rheinisch Westflischen Technischen Hochschule Aachen, Goethestrasse 27-29, D-5100 Aachen, W. Germany). *Langenbecks Arch. Chir.* 341(1):1-9; 1976.

5814 VOLVULUS OF THE CECUM SIMULATING ANOREXIA NERVOSA. (Eng.) Ketonen, P. E. S.; Mattila, S. P.; Ketonen, L. (Univ. Central Hosp., 00290 Helsinki 29, Finland). *Int. Surg.* 61(4):235-236; 1976.

5815 BENIGN RECTAL ULCERATION OF UNKNOWN ORIGIN: AN UNUSUAL CAUSE OF RECTAL BLEEDING. (Eng.) Howard, E. R.; Whimster, W. F. (King's Coll. Hosp., London, SE5 9RS, England). *Arch. Dis. Child.* 51(2): 156-157; 1976.

5816 MALROTATION OF THE BOWEL IN INFANTS AND CHILDREN: A 15 YEAR REVIEW. (Eng.) Stewart, D. R.; Colodny, A. L.; Daggett, W. C. (Primary Children's Medical Center, 320 12th Ave., Salt Lake City, UT 84103). *Surgery* 79(6): 716-720; 1976.

See also, 5389, 5485, 5486, 5493, 5524, 5529, 5550, 5560, 5586, 5587, 5625, 5650, 5722, 5725, 5726, 5733, 5759, 6045, 6089, 6095, 6098, 6102.

LARGE INTESTINE

Ulcerative Colitis

5817 BISEPTOL IN THE TREATMENT OF ULCERATIVE COLITIS. (Pol.) Tkaczewski, W.; Niedzielska, H. (Clinic Infectious Diseases, WAM, Lodz, Poland). *Pol. Tyg. Lek.* 30(7):293-294; 1975.

The efficacy of biseptol, a compound of trimethoprim and sulfamethoxazole, in the treatment of ulcerative colitis was tested in 20 patients with clinically confirmed disease. Twelve patients had recurring disease. At the beginning of treatment, the dosage was 2 tablets twice a day; upon visible improvement, the dosage was reduced to 2 tablets once a day. The patients' progress was followed up by routine daily clinical examination (temperature measurements, stool exam, and check-up for abdominal pains), supplemented by weekly proctoscopic examination and morphological and blood tests (blood count, level and composition of blood proteins, activity of alanine aminotransferase). At the end of treatment (2 weeks to over 2 months), seven cases showed good results: a drop in temperature, disappearance of abdominal pains and of diarrhea, and a decrease in the production of pus from the mucosa of the large intestine. Ten cases showed satisfactory results; the ulceration of the large intestine persisted. Three cases showed no improvement at all. The results confirm the suitability of biseptol for the treatment of ulcerative colitis.

5818 ACETYLATION POLYMORPHISM OF SULFAPYRIDINE IN PATIENTS WITH ULCERATIVE COLITIS AND CROHN'S DISEASE. (Eng.) Das, K. M.; Eastwood, M. A. (Albert Einstein Coll. Medicine, 1300 Morris Park Ave., Bronx, NY 10461). *Clin. Pharmacol. Ther.* 18(1):514-520; 1975.

The consistency of acetylator phenotyping was studied on the basis of sulfapyridine (SP) metabolites obtained from sulfasalizine (SASP) in 122 patients with ulcerative colitis and Crohn's disease. The patients were divided into four groups. Group A consisted of 21 patients (16 ulcerative colitis, 5 Crohn's disease) with new, untreated disease. Within 24 hr of admission, these patients were classified as either fast or slow acetylators by the administration of sulfadimidine. Treatment with SASP, steroids, and other standard therapies followed. Group B was composed of nine patients (6 ulcerative colitis, 3 Crohn's disease), who were admitted with relapse or who were receiving SASP before hospitalization. Treatment was similar to that used for Group A. Group C consisted of 31 patients, (20 ulcerative colitis, 11 Crohn's disease) in remission or experiencing only mild disease. They had been using SASP for 6 months to 15 yr. Group D consisted of 44 patients with ulcerative colitis and 27 with Crohn's disease who had been taking SASP. Blood samples taken from this group to estimate SASP metabolites; they provided an estimate for the frequency of acetylator phenotypes in this population. Blood and urine were collected from all patients. Results indicated that SP shares the same acetylation polymorphism as sulfadimidine. All patients phenotyped as fast or slow acetylators by the sulfadimidine method belonged to the same class with SP. Among patients with ulcerative colitis and Crohn's disease, the mean serum and urine t^2 values did not differ significantly between slow (serum=26.0 ± 8.0%; urine=40.6 ± 9.7%) and fast (serum=63.3 ± 9.2%; urine=75.7 ± 8.2%) acetylators. With an altered dose of SASP (2-8 g/day), the total SP concentration changed proportionally (10-80 μg/ml serum), while the acetylation observed remained constant. It is concluded that a single study of serum can determine acetylator phenotype in patients on sulfasalazine therapy without any other drug and may help ascertain dosage and assess side effects.

5819 SERUM C_3 and C_4 COMPLEMENT COMPONENTS IN ULCERATIVE COLITIS AND CROHN'S DISEASE. (Eng.) Ward, M.; Eastwood, M. A. (Western General Hosp., Univ. Edinburgh, Edinburgh EH4 2XU, Scotland). *Digestion* 13(1/2):100-103; 1975.

Because of the suggestion that local formation of cytotoxic complement-binding immune complexes contributes to tissue destruction in inflammatory bowel disease, serum C_3 and C_4 components were estimated by radial immunodiffusion in 32 patients with Crohn's disease, 30 patients with ulcerative colitis, 13 asymptomatic patients who had undergone total colectomy for ulcerative colitis, and 14 healthy controls. The mean serum C_3 and C_4 concentrations were increased compared to controls (86.3 and 25.3, resp.) in patients with Crohn's disease (98.9 and 38.8, resp.) and in patients with ileostomy (106.8 and 42.3, resp.), but was only statistically significant for C_4 ($p<0.01$ for both groups). The elevated C_4 concentration in the subjects with ileostomy may be related to the known persistence of disturbances of immunoglobulin metabolism in ileostomy patients, or to the fact that patients with severe and extensive ulcerative colitis are more prone to surgery. The mean C_3 concentration in patients with ulcerative colitis in remission (69.4) was significantly lower than in controls ($p<0.05$). In patients with Crohn's disease in remission, the C_3 and C_4 levels (109.5 and 43.5, resp.) were increased in comparison with controls. The difference between the two diseases in remission may be partly due to difficulties in the clinical determination of true remission of Crohn's disease or may reflect fundamental differences in the repair process in the two conditions. Increasing activity in ulcerative colitis was associated with increasing concentrations of C_3 and C_4. The mean concentration of C_3 in those patients with ulcerative colitis involving the entire colon (109.7) was significantly higher than that in patients with distal disease (79.6, $p<0.05$). These results support previously published reports of minor elevations or normal levels in total complement in ulcerative colitis.

5820 ACUTE FULMINANT ULCERATIVE COLITIS WITH TOXIC MEGACOLON. (Ger.) Boehm, N.; Gospos, Ch. (Pathol. Institut der Univ., 78 Freiburg, Albertstr. 19, W. Germany). *Med. Welt* 27(1): 41-45; 1976.

5821 THE CEA TEST IN ULCERATIVE COLITIS AND CROHN'S DISEASE. A PROSPECTIVE CLINICAL INVESTIGATION. (Dan.) Knudsen, L.; Siemssen, O. (Med. Dept. P., Rigshospitalet, Blegdamsvej 9, DK-2100 Copenhagen ϕ, Denmark). *Ugeskr. Laeger* 137(31):1775-1778; 1975.

5822 NOTES ON A CASE OF HYPERTROPHIC ULCEROUS COLITIS. (Ita.) Albano, D.; Robotti, D. (S. Spirito Hosp., Casale Monferrato, Italy). *Minerva Gastroenterol.* 21(3):161-164; 1975.

5823 ULCERATIVE COLITIS IN ADVANCED AGE. (Ger.) Friedrich, P.; Poegel, K. (I. und II. Medizinische Klinik des Stadtkrankenhauses Dresden-Neustadt, 8023 Dresden, Industriestr. 40, E. Germany). *Dtsch. Gesundheitswes.* 31(11):516-519; 1976.

See also, 5526, 5764, 5779, 6046.

PANCREAS

5824 PANCREAS SCAN. (Ger.) Schneider, C.; Montz, R. (Nuklearmedizin der Radiolog., Univ.-Klinik und Strahleninstitut D-2000 Hamburg 20, Martinstr. 52, Germany). *Radiologe* 15(5): 203-209; 1975.

5825 SUBSTRACTION SCINTIGRAPHY OF THE PANCREAS BY MEANS OF THE LINEAR SCINTIGRAPH· EXAMINATION OF 300 CASES. (Fre.) Dor, L. G. (Hopital Civil de Chatelet, Belgium). *J. Belge Radiol.* 58(5):411-421; 1975.

5826 FIRST CLINICAL EXPERIENCE WITH PANGROL 400. COMMUNICATION 1: GENERAL REQUIREMENTS ON A PANCREATIC ENZYME PREPARATION—DESCRIPTION OF PANGROL 400. (Ger.) Sielaff, F.; Dietze, F. (Medizinische Poliklinik des Bereichs Medizin [Charite], Humboldt-Universitat, Hermann-Matern Str. 13a, E. Germany). *Dtsch. Gesundheitswes.* 31(23):1081-1084; 1976.

5827 PANCREATIC CALCIFICATION: ETIOLOGICAL, CLINICAL AND PROGNOSTIC STUDY. ANALYSIS OF 17 CASES. (Spa.) Santa Lopez, J. de la; Campos, F. R. R.; Pascual, A. H. (Ciudad Sanitaria Virgen del Rocio, Sevilla, Spain). *Rev. Clin. Esp.* 140(1):43-50; 1976.

5828 SECRETIN AND PANCREOZYMIN TESTS IN THE STUDY OF CHRONIC DISEASES OF THE EXOCRINE PANCREAS. (Ita.) Naccarato, R.; Farini, R.; Lise, M.; Zotti, E.; Pedrazzoli, S.; Fabris, G.; D'Angelo, A.; Ossi, E.; Polin, R.; Sturniolo, G. C.; Adorati, M.; Del Favero, G. (Istituto di Clinica Medica I, Universita di Padova, Padova, Italy). *Prog. Med. (Roma)* 31(18):735-746; 1975.

5829 THE PHYSIOPATHOLOGY OF THE EXTERNAL PANCREATIC SECRETION. (Pol.) Dzieniszewski, J. (Klinika Gastroenterologii CMKP, ul. Goszczynskiego 1, 02-616 Warsaw, Poland). *Przegl. Lek.* 33(2):280-289; 1976.

5830 FUNCTIONAL CONDITION OF THE PANCREAS WITH THE AGING OF MAN. (Rus.) Valenkevich, L. N. (Leningrad Medical Inst. Pediatrics, Leningrad, USSR). *Klin. Med. (Mosk.)* 54(4):119-123; 1976.

5831 ENDOSCOPICAL AND RADIOLOGICAL STUDIES AFTER PAPILLOTOMY. (Ger.) Soehendra, N. (Chirurgische Univ.-Klinik und -Poliklinik Hamburg, Martinistrasse 52, D-2000 Hamburg, W. Germany). *Langenbecks Arch. Chir.* 341(1):39-49; 1976.

5832 BILIOPANCREATIC BYPASS: PROPOSAL AND PRELIMINARY EXPERIMENTAL STUDY OF A NEW METHOD FOR THE FUNCTIONAL SURGICAL TREATMENT OF OBESITY. (Ita.) Scopinaro, N.; Gianetta, E.; Pandolfo, N.; Anfossi, A.; Berretti, B.; Bachi, V. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica B, Universita degli Studi di Genova, Genova, Italy). *Minerva Chir.* 31(10):560-566; 1976.

5833 A CASE OF ANNULAR PANCREAS COMPLICATED WITH GALLBLADDER CALCULI AND COMMON BILE DUCT CALCULI (Jpn.) Miura, T.; Ohishi, H.; Hachiya, T.; Sunagawa, M.; Aburaya, R.;

Okabayashi, M.; Imagawa, A.; Uchimoto, I. (Cancer Center, Nara Prefectural Med. Univ., Japan). *Jpn. J. Clin. Radiol.* 21(1):55-60; 1976.

5834 X-RAY FINDINGS IN PEDIATRIC SURGICAL EMERGENCIES. (10) ANNULAR PANCREAS AND MALROTATION OF INTESTINE. (Jpn.) Matsuyama, S.; Nagashima, K.; Suzuki, N.; Oohama, Y. (Gunma Univ. Sch. Medicine, Maebashi, Japan). *Kitakanto Med. J.* 25(6):381-384; 1974.

5835 PSEUDOCYSTS AND RECENT CLOSED TRAUMA OF THE PANCREAS. (Fre.) Spay, G.; Remignon, M.; Padonou, N. (Pavillon des Urgence, Hopital Ed.-Herriot, Lyon, France). *Lyon Chir.* 71(5):332-333; 1975.

See also, 5498, 5531, 5532, 5533, 5536, 5540, 5541, 5542, 5558, 5561, 5564, 5565, 5566, 5574, 5577, 5649, 5836, 5884, 6036, 6039, 6064.

PANCREAS

Pancreatitis

5836 SURGICAL TREATMENT OF CYSTS AND FISTULAS OF THE PANCREAS. (Rus.) Borovyi, E. M.; Nesterenko, L. N.; Bas, V. M.; Syvyi, N. Yu. (Dept. Surgery Digestive Tract, 50th Anniversary of USSR Rovno Provincial Hosp., Rovno, USSR). *Klin. Khir.* (5):26-30; 1975.

Experience with surgical treatment of 32 cases of pancreatic cysts is reviewed. Four patients were children under 10 yr, two patients were between 11 and 20 yr, nine patients were aged 21-30, seven patients were 31-40, six patients were 41-50, and four patients were over 60 yr. Cyst formation was caused by acute pancreatitis in 22 cases and by trauma in 10 cases. The location of the cysts was determined by roentgenological examination in 23 of 29 patients; 3 were in the head of the pancreas, 15 in the body of the gland, and 5 in its tail. Preoperative complications included rupture of the cyst and development of peritonitis (3 cases), infection of the cyst (4 cases), and bleeding (1 case). In addition, 13 patients developed mechanical jaundice, and 3 developed obstruction of the duodenum. The type of surgery was selected according to general condition of the patient and the surgical risk. Marsupialization of the cyst was performed in 14 cases, resection of the cyst in 2 cases, cystoenteroanastomosis by Shalimov's modification in 13 cases, cystojejunoduodenoplasty after Karavanov in 2 cases, and lumbobotomy and draining of the cyst in 1 case. No deaths occurred immediately after surgery. Two patients died 6 months later, one from diabetes and one from hepatargia after bile duct surgery. Five patients developed pancreatic fistulas that, despite conservative therapy, persisted 6-12 months after the operation. In these cases, Littman's modified surgical method was applied, implanting the fistula track and fistula into the jejunum, creating a dead end after Shalimov and Braun's anastomosis. The immediate and long-term results are satisfactory.

5837 PANCREATITIS AFTER CARDIAC SURGERY: A MORPHOLOGIC STUDY. (Eng.) Feiner, H. (Univ. Hosp., 550 First Ave., New York, NY 10016). *Am. J. Surg.* 131(6):684-688; 1976.

The incidence of pancreatitis was determined in 182 patients who died after cardiac surgery, and the pathogenesis of pancreatitis complicating this surgery was defined. Thirty-four instances of pancreatitis were recorded, but in five of these, pancreatitis was possibly related to events other than cardiac surgery. In the remaining 29 patients, pancreatitis was graded as mild (scattered focal parenchymal necrosis and fat necrosis, 17 patients), moderate (same changes, but quantitatively increased, 8 patients), or severe (confluent zones of pancreatic necrosis, 4 patients). In all instances, there was evidence of parenchymal necrosis with or without fat necrosis. In some patients, necrosis affected the periphery of lobules with preservation of the centers. Necrosis was usually associated with a sparse leukocytic infiltrate. Microscopic evidence of thromboembolism was noted in nine patients. The vessel types in which thromboemboli were found were muscular artery (1 patient), small artery (1), arteriole (5), capillary (1), venule (3), and vein (1). Since only one or two sections of each gland were available for histologic evaluation, the true incidence of pancreatic thromboemboli is probably greater than that actually recorded. Pancreatitis was not related to any particular surgical procedure. Because both arterial thromboemboli and venous thrombosis occurred, and these processes affected vessels of various caliber, a variety of factors must predispose to the formation of these thrombi. The findings indicate that pancreatitis occurring after cardiac surgery is ischemic in nature. The ischemia may be due to mechanical obstruction of blood vessels secondary to a variety of causes, or it may be functional, i.e., due to hypoperfusion. The assessment of hemodynamic status and coagulation profile in conjunction with serum levels of pancreatic enzymes may aid in the early recognition and management of this complication.

5838 A CONTROLLED CLINICAL TRIAL OF TRASYLOL IN THE TREATMENT OF ACUTE PANCREATITIS. (Ger.) Trapnell, J. E.; Rigby, C. C.; Talbot, C. H.; Duncan, E. H. L. (Royal Victoria Hosp., Bournemouth, England). *Med. Welt* 25(50):2106-2111; 1974.

A double-blind study to examine the effectiveness of aprotinin in the treatment of acute pancreatitis was carried out. Treatment in all cases was begun immediately upon establishment of a confirmed or suspected diagnosis, and consisted of analgesics, fluid replacement, cristamycin, propantheline bromide, and aprotinin A or B. The 53 patients treated with aprotinin A were similar to the 52 treated with aprotinin B, with respect to age, severity of initial illness, and time between appearance of symptoms and drug administration. A significant difference in overall mortality was seen between the two groups: 4 patients died in group A, and 13 in group B. After these findings were obtained, it was found that group A had been given active aprotinin, and group B, a placebo. Increased mortality was seen with increasing age in group B. The initial assessment of the severity of the pancreatitis was only partially correlated with the course of the illness. The number of patients in whom the disease course was evaluated as mild was greater in group A than in group B (57% versus 22%), and the number of cases evaluated as severe was greater in group B (15%, compared to 11% for group A). Only an overall consideration of the course allowed satisfactory evaluation, since any single symptom could vary, regardless of treatment. Administration of aprotinin in all cases of acute pancreatitis seems indicated.

5839 SPHINCTEROPLASTY IN SELECTED CASES OF ACUTE RECURRENT PANCREATITIS. (Eng.) Hutson, D. G.; Zeppa, R.; Levi, J. U. (Univ. Miami Sch. Medicine, P.O. Box 520875, Biscayne Annex, Miami, FL 33152). *Am. Surg.* 42(3):163-165; 1976.

The case histories of two patients who were successfully treated with sphincteroplasty for acute, recurrent pancreatitis are presented. The patients, two male alcoholics (aged 35 and 45 yr), repeatedly experienced abdominal pain and hyperamylasemia when attempts at p.o. feeding were made. Both patients differed from previously reported cases of acute pancreatitis in that surgical exploration and pancreatography failed to demonstrate obstructive lesions of the pancreatic or common bile ducts. At surgery, an inflamed pancreas, with marked edema in the entire pancreatic and peripancreatic area, was seen in the first patient, together with retroperitoneal fat necrosis in the lower quadrant. A similar picture was seen in the second patient, and a pancreatogram revealed evidence consistent with acute pancreatitis, but without ductal dilatation or local obstruction. Sphincteroplasty in both patients was followed by an uncomplicated recovery. A 10-month follow-up examination in the second patient revealed that he was asymptomatic and had maintained his weight. Because of the risks involved in this operation, it should be limited to uncommon situations, as in these patients.

5840 MECHANISMS OF HYPOCALCEMIA IN ACUTE HEMORRHAGIC PANCREATITIS. (Eng.) Peoples, J. B.; Webster, M. W., Jr.; Carey, L. C. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA). *Surg. Gynecol. Obstet.* 141(5):724-726; 1975.

The hypothesis that the hypocalcemia occurring in acute pancreatitis is caused by thyrocalcitonin release, which is mediated by glucagon secreted from the inflamed pancreas, was tested in thyroidectomized and nonoperated pigs with chemically-induced pancreatitis. Pancreatitis was induced using 20 ml of 7% sodium taurocholate solution containing 20,000 U of trypsin. No significant difference was seen in the average fall in serum calcium concentration between five thyroidectomized pigs (1.56 ± 0.25 mg%) and thyroid-intact pigs (1.49 ± 0.19 mg%) at 24 hr after the induction of pancreatitis. Between 24 and 48 hr, the serum calcium levels of the thyroidectomized pigs gradually returned toward the baseline, while those in the thyroid-intact pigs continued to drop. By 48 hr, the serum calcium level in the thyroidectomized pigs was 0.90 ± 0.57 mg%, compared with 1.83 ± 0.38 mg% in the thyroid-intact pigs ($p<0.01$). Serum thyroxine levels averaged 1.9 mg% prior to thyroidectomy and at the time of induction of pancreatitis. The differences observed in the degree of hypocalcemia between the two groups 24-48 hr after the induction of pancreatitis may be significant, but could be explained by dilutional differences alone. Thyrocalcitonin apparently has little, if any, role in the hypocalcemia observed during the course of acute pancreatitis.

5841 BEHAVIOR OF URINARY KALLIKREIN DURING ACUTE PANCREATITIS. (Ita.) Butti, A.; Ronzoni, G.; Porcelli, G.; Pigliucci, G. M.; Maria, G. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica, Univ. Cattolica del Sacro Cuore, Rome, Italy). *Chir. Patol. Sper.* 22(5):302-307; 1974.

Urinary kallikrein was measured spectrophotometrically by its esterase activity in 12 patients (7 women and 5 men, aged 22-56) with acute pancreatitis. Results were comparable to those in 24 normal individuals used as controls. Even though plasma kallikrein activity increases in acute pancreatitis, it is apparently blocked at the level of the kidney. Since kallikrein has a molecular weight of about 37,000-40,000, it may be that the kallikrein molecule cannot filter through the kidney. The data confirm that the renal secretion of kallikrein is completely independent of plasma kallikrein levels.

5842 THE ROLE OF BILIARY MICROLITHIASIS IN ACUTE PANCREATITIS. A STUDY OF A SERIES OF 31 CASES. (Fre.) Mouiel, J.; Chauvin, P.; Borelli, J.-P.; Bus, J.-J.; Giaume, F.; Bourgeon,

R. (Hopital Saint Roch, 06000 Nice, France). *Chirurgie* 101(4):258-265; 1975.

Biliary microlithiasis has been found to be a factor in the development of 80% of acute pancreatitis (31/38 patients) observed over the past 3 yr. Three case histories are reported. Systematic peroperative exploration should be undertaken by opening the gallbladder and the common bile duct even in the absence of radiological symptoms, as was the case in nine patients. Treatment should immediately relieve canalicular hyperpressure; cholecystectomy and drainage choledocotomy are systematic. Prognosis was determined by the presence of pancreatic necrosis, which was not uncommon, and explained the high mortality rate (9/31). Acute pancreatitis may be of retrograde origin, as a result of lithiasis of the main bile duct or of lesions of the bile duct, which are indicative of lithiasic migration and evidence of biliary reflux into the Wirsung canal (2/3 cases).

5843 SPECIFIC LYMPHOCYTE SENSITIZATION IN CHRONIC PANCREATITIS. (Eng.) Schutt, C.; Friemel, H.; Schulze, H. A.; Zubaidi, G. (Inst. Biochemistry, Univ. Rostock, Leninallee 70, DDR-25, Rostock, E. Germany). *Digestion* 13(5):308-311; 1975.

An *in vitro* test for the detection of specific lymphocyte sensitization in chronic pancreatitis was carried out in the lymphocytes of normal persons, patients with chronic pancreatitis, acute exacerbations of chronic pancreatitis, and acute pancreatitis, and in the lymphocytes of patients with other diseases. Peripheral blood lymphocytes from the heparinized blood of 47 subjects were cultured and stimulated with specific human pancreas antigens. Sixty-eight tests were performed. If the lymphocytes are sensitized *in vivo* during pancreatic destruction, they are transformed to blast cells during this test. The degree of blast transformation is measured by the DNA synthesis rate. Significant positive results were found only in cases of chronic pancreatitis. The results obtained to date suggest that the lymphocyte transformation test is helpful in correctly diagnosing chronic pancreatitis. No further preparation of the organ-specific proteins appears necessary for this diagnostic procedure. It may be possible to distinguish chronic pancreatitis from pancreatic carcinoma by an extension of this immunological study.

5844 LYMPHOCYTE SENSITIZATION IN HUMAN CHRONIC PANCREATITIS. (Ita.) Gulla, P.; Marocco, A. (Istituto di Clinica Chirurgica e Terapia Chirurgica dell'Univ. di Perugia, Perugia, Italy). *Acta. Chir. Ital.* 31(1):57-62; 1975.

To determine if the pathogenesis of chronic human pancreatitis has an autoimmune basis, lymphoblast transformation was studied in 10 patients with the disease and in 10 normal controls; the Coulson and Chalmers procedure was followed. In cultures containing lymphocytes only, blast transformation was either minimal or nonexistent. In cultures with lymphocytes and phytohemagglutinin, blast transformation was about 60%. In lymphocyte and antigen cultures, the percentage was 15% in patients in both chronic and acute stages. Cultures from the controls had a blast transformation of about 2%. The results demonstrate a moderate immune response in chronic pancreatitis whose function may be the maintenance of a chronic inflammatory process of the pancreas previously damaged in the initial clinically apparent phase.

5845 A PRELIMINARY INVESTIGATION OF DIAGNOSTIC USE OF THE PANCREATIC EXOCRINE AND ENDOCRINE FUNCTIONS AFTER SECRETIN AND PANCREOZYMIN STIMULATION. (Pol.) Popiela, T.; Sznajd, J.; Szybinski, Z.; Karcz, D.; Labza, H.; Jamska, B.; Wojtasiewicz, A.; Woroniecka, M.; Sieradzki, J. (Z Samodzielnego Oddzialu Gastroenterologicznego AM, Krakow, Poland). *Przegl. Lek.* 32(2):280-282; 1975.

5846 ENDOSCOPIC PANCREATOCHOLANGIOGRAPHY IN DIAGNOSING CHRONIC PANCREATITIS. (Rus.) Logunov, A. S.; Vasiliev, Yu. V. (Central Scientific Res. Inst. Gastroenterology, Moscow, USSR). *Sov. Med.* (2):42-45; 1976.

5847 PROGRESS IN DIAGNOSIS AND TREATMENT OF ACUTE PANCREATITIS. (Pol.) Pokora, J. (Instytutu Chorob Wewnetrznych AM, 20-960 Lublin, ul. Jaczewskiego 8, Poland). *Przegl. Lek.* 33(2): 294-298; 1976.

5848 PRACTICAL GUIDELINES FOR MEDICAL THERAPY OF CHRONIC PANCREATITIS. (Ita.) Merli, G. M.; Spotti, D.; Rancati, M. (Divisione Medical "L. Resnati," Ospedale Maggiore S. Carlo Borromeo, Milan, Italy). *Minerva Gastroenterol.* 22(1):108-115; 1976.

5849 INTRAHEPATIC BLOOD CIRCULATION DURING EXACERBATION OF CHRONIC PANCREATITIS. (Rus.) Geller, L. I.; Petrenko, V. F.; Bulgakova, O. S. (Khabarovsk Medical Inst., Khabarovsk, USSR). *Vrach. Delo* (10):83-86; 1975.

5850 EXPERIENCE WITH LIPASE FROM Rhizopus arrhizos IN THE TREATMENT OF PANCREATIC INSUFFICIENCY. (Ger.) Pointner, H.; Flegel, U. (No affiliation given). *Z. Gastroenterol.* 14:250; 1976.

5851 CHRONIC PANCREATITIS: PRACTICAL GUIDELINES FOR SURGERY. (Ita.) Pliteri, S.; Uberti, E.; Garavaglia, A.; Fumagalli, M. (Divisione Chirurgica "L. Resnati," Ospedale Maggiore S. Carlo Borromeo, Milan, Italy). *Minerva Gastroenterol.* 22(1):116-120; 1976.

5852 CHRONIC PANCREATITIS: LABORATORY TESTS. (Ita.) Arisi Petrini, C.; Giorcelli, F. (Laboratorio di Biochimica, Ospedale Maggiore S. Carlo Borromeo, Milan, Italy). *Minerva Gastroenterol.* 22(1):78-82; 1976.

5853 PATHOLOGICAL ANATOMY OF CHRONIC PANCREATITIS. (Ita.) Parini, F.; Sfondrini, G. (Istituto di Anatomia Patologica, Ospedale Maggiore "Ca Granda," Milan, Italy). *Minerva Gastroenterol.* 22(1):69-73; 1976.

5854 CHRONIC PANCREATITIS: TERMINOLOGY AND CLASSIFICATION. (Ita.) Bianchi, P. A. (Instituto di Clinica Medica I, Milan, Italy). *Minerva Gastroenterol.* 22(1):64-68; 1976.

5855 ETIOPATHOGENIC AND CLINICAL ASPECTS OF CHRONIC PANCREATITIS IN SAO PAULO (BRAZIL): STUDY OF 80 CASES. (Por.) de Barros Mott, C.; Ohki, Y.; Brandao Barros, M. I.; Conte, V. P.; Machado, M. C. C.; Bove, P.; Bettarello, A. (Disc. de Gastroenterol., Hosp. das Clin. de Sao Paulo, Sao Paulo, Brazil). *Rev. Assoc. Med. Bras.* 21(9):281-284; 1975.

5856 ACUTE PANCREATITIS (ETIOLOGY, PATHOGENESIS AND PATHOBIOCHEMISTRY). (Bul.) Brailski, Khr. (Inst. Gastroenterology, Medical Acad., Bulgaria). *Vutr. Boles.* 14(4):1-11; 1975.

5857 THE ETIOPATHOGENESIS OF ACUTE PANCREATITIS. (Pol.) Gabryelewicz, A. (Kliniki Gastroenterologii Instytutu Chorob Wewnetrznych AM, Bialystok, ul. M. Curie-Sklodowskiej 24a, Poland). *Przegl. Lek.* 33(2):289-293; 1976.

5858 LIVER LESIONS ASSOCIATED WITH CHRONIC PANCREATITIS. (Fre.) Callet, B.; Bernades, P.; Molas, G.; Dupuy, R. (Hopital Beaujon, F 92110 Clichy, France). *Arch. Fr. Mal. App. Dig.* 64(6): 521-527; 1975.

5859 PANCREATITIS AFTER OPERATIONS FOR COMPLICATED CHOLELITHIASIS. (Rus.) Kachurin, V. S.; Kiselev, A. I. (Leningrad Inst. Medicine and Hygiene, Leningrad, USSR). *Vestn. Khir.* 115(11): 28-33; 1975.

5860 PANCREATITIS ASSOCIATED WITH OBSTRUCTIVE JAUNDICE IN CHILDREN. (Rus.) Reizis, A. R.; Strutsovskaia, A. L.; Rudenskaia, I. N.; Drozdova, G. A.; Akopian, V. G.; Pshenichnikov, V. N. (M. F. Vladimirskii Moscow Regional Scientific Res. and Clinical Inst., Moscow, USSR). *Vopr. Okhr. Materin. Det.* 20(12):18-22; 1975.

5861 ALCOHOLIC PANCREATITIS LEADING TO PSEUDOCYST AND RUPTURE OF THE STOMACH. (Spa.) Garcia Cabezas, J.; Yuguero del Moral, L.; Garralon Velasco, R. M.; Garcia Molinero, M. J.; Fernandez-Cruz Linan, A. (Catedra I de Patologia General, Universidad Complutense de Madrid, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(1):101-118; 1976.

5862 RECURRENT CHRONIC PANCREATITIS WITH INTERCURRENT DISSEMINATED INTRAVASCULAR COAGULATION AND THROMBOEMBOLISM: REPORT OF ONE CASE. (Por.) Menezes, D. M. F. de; Paula, M. E. de; Trindade, L. C.; Matsumoto, M. (Departamento de Patologia da U.F.F., Brazil). *J. Pediatr. (Riodej.)* 40(9/10):295-298; 1975.

5863 THE KALLIKREIN-KININ SYSTEM OF THE BLOOD IN PATIENTS WITH ACUTE PANCREATITIS. (Rus.) Orlov, V. A.; Beliakov, N. V. (I. M. Sechenov Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (11): 24-28; 1975.

5864 THE ROLE OF SERUM COMPLEMENT IN THE GENESIS OF ACUTE PANCREATITIS. (Ger.) Seelig, R.; Seelig, H. P. (Institut fur Pathologie, Universitat Heidelberg, Heidelberg, W. Germany). *Verh. Dtsch. Ges. Pathol.* 59:475; 1975.

5865 ALLERGY OF DELAYED TYPE IN PATIENTS WITH CHRONIC PANCREATITIS. (Rus.) Geller, L. I.; Ostrovsky, A. B. (Khabarovsk Medical Inst., Khabarovsk, USSR). *Ter. Arkh.* 47(9):117-120; 1975.

5866 THE COMPLEMENT SYSTEM AS A MEDIATOR OF ACUTE EXPERIMENTAL PANCREATITIS OF IMMUNOLOGICAL AND NONIMMUNOLOGICAL GENESIS. (Ger.) Seelig, R.; Seelig, H. P. (Institut fur Pathologie, Universitat Heidelberg, Heidelberg, W. Germany). *Z. Gastroenterol.* 14:247-248; 1976.

5867 KININOGENASE AND KININOGEN IN THE BLOOD PLASMA OF PATIENTS WITH ACUTE PANCREATITIS. (Rus.) Suvalskaya, L. A. (I. I. Dzhanelidze Scientific Res. Inst. First Aid, Leningrad, USSR). *Klin. Med.* 54(2):55-57; 1976.

5868 AMYLASE ACTIVITY IN PAROTID SALIVA IN ACUTE AND CHRONIC PANCREATITIS AT REST AND FOLLOWING SECRETIN- AND PANCREOZYMIN-STIMULATION. (Ger.) Grimmel, K.; Rossbach, G.; Kasper, H. (No affiliation given). *Z. Gastroenterol.* 14:245-246; 1976.

See also, 5533, 5534, 5541, 5559, 5576, 5577, 5735, 5872.

5869 THE ABNORMAL HEPATIC SCAN OF CHRONIC LIVER DISEASE: ITS RELATIONSHIP TO HEPATIC HEMODYNAMICS AND COLLOID EXTRACTION. (Eng.) Horisawa, M.; Goldstein, G.; Waxman, A.; Reynolds, T. (Nagoya Univ. Sch. Medicine, Nagoya, Japan). *Gastroenterology* 71(2):210-213; 1976.

To elucidate the characteristic hepatic scan pattern of chronic liver disease, the degree of scan abnormality (scan score, SS) after the administration of technetium-99m sulfur colloid (Tc) was compared with data obtained at hepatic vein catheterization in 28 patients. Although SS showed a correlation with wedged hepatic vein pressure (r=+0.491), the scan abnormality was not directly due to portal hypertension, because it remained unchanged when the latter was relieved by portacaval shunt. Since SS showed a poor positive correlation with hepatic blood flow (r=0.262), the scan abnormality was unrelated to a low hepatic blood flow. Scan abnormality was not attributable primarily to hyperactivity of the reticuloendothelial (RE) cells of the spleen and bone marrow, since fractional clearance (K) of Tc from the blood was decreased (K ranged between 0.007 and 0.220) rather than increased in patients with abnormal scans. SS was inversely correlated with K of Tc (r=-0.575) and with hepatic extraction efficiency for Tc (r=-0.673), showing that the basic abnormality was poor extraction of the colloid by the RE cells of the liver, with a resultant increase in the amount available for extrahepatic localization. Indirect evidence suggests that this poor extraction of colloid is due to intrahepatic shunts bypassing hepatic RE cells.

5870 CONTROLLED CLINICAL EXPERIMENTATION WITH 2-MERCAPTO-PROPIONYLGLYCINE (THIOLA) IN CHRONIC LIVER DISEASE. (Ita.) Dioguardi, N.; Ideo, G.; Roda, E.; Ronchi, G.; Labo, G.; Barbara, L.; Gasbarrini, G.; Roda, E.; Miglio, F.; Ventura, E.; Agnolucci, M. T.; Zeneroli, M. L.; Albano, O.; Leo, M.; Muiesan, G.; Corea, L.; Agabati-Rosei, E.; Sala, G.; Mandelli, M.; Curzio, M.; Avogaro, P.; Pasquino, M. (Istituto Clinica Medica III, Via Pace 15, Milan, Italy). *Minerva Med.* 67(11):676-681; 1976.

To test the effects of 2-mercapto-propionyl-glycine (2-MPG) in chronic liver disease, a group of patients with persistent chronic liver disease (group I) and a group with aggressive chronic hepatitis and compensated hepatic cirrhosis (group II) received 2.5 g of 2-MPG, i.v., or placebo/day, and vitamin B_{12}. In patients treated with 2-MPG, transaminase serum levels fell significantly by the end of treatment. BSP retention was improved by 2-MPG, especially in group II. Bilirubinemia was reduced, especially in group II, by 2-MPG or placebo, suggesting that bed rest was probably the causal factor. Other biochemical parameters, such as cholesterolemia, prothrombinic activity, and total proteinemia were not significantly modified. The inhibitory action of 2-MPG is probably related to its antioxidant action; the significant reduction of transaminases suggests that its main pharmacological effect is the protection of the hepatocytic membrane. Improved BSP clearance is either due to 2-MPG protection of the hepatocytic membrane or to competition with reduced glutathione as a donor of hydrogen ions.

5871 BARBITURATES: LIVER AND BILE SECRETION. (Fre.) Plomteux, G.; Crismer, R. (Laboratoire de Chimie medicale, 1, rue des Bonnes Villes, B 4000 Liege, Belgium). *Ann. Gastroenterol. Hepatol.* 12(2):81-89; 1976.

The action of barbiturates on the liver enzymes and the physiologic and pharmacologic consequences are reviewed. Biochemical and pharmacological data show that barbiturates stimulate glucuronyltransferase activity in hepatocytes. Thus, they can significantly reduce hyperbilirubinemia in jaundice with free bilirubin, essentially Gilbert's and Dubin-Johnson's syndromes, and Crigler-Najjar neonatal jaundice. Since barbiturates also act as inductors of the microsomal enzymes, which detoxify certain drugs, such as alcohol, bishydroxycoumarin, diphenylhydantoin, and steroids, drug combination therapy with barbiturates may be ineffective. They possess a choleretic effect, which may be of use in the treatment of hepatic cholestases.

5872 EXAGGERATED PANCREATIC RESPONSE TO SECRETIN. (Fre.) Wettendorff, P.; van der Hoeden, R.; Delcourt, A. (Institut medico-chirurgical Ixelles, rue Jean Paquot 63, B-1050 Bruxelles, Belgium). *Acta Gastroenterol. Belg.* 37(12):520-528; 1974.

The pancreas of 250 patients was successively stimulated with Boots and GIH secretin (1 U/kg, i.v.). Bicarbonate parameters measured in the duodenal fluid were bicarbonate flow rate and maximum bicarbonate concentration. Eleven patients had an excessive reaction to the hormone with an increase in bicarbonate concentration. In seven of these patients (1 with Zeive's syndrome, 1 with pancreatitis with hepatic steatosis, and 5 with alcoholic cirrhosis), the maximum concentration was under or near the lower limit of the norm; the reaction was of biliary origin. In the remaining patients (4 with pancreatitis with first signs of recurrence), the reaction was of pancreatic origin, and the maximum bicarbonate concentration was normal. The reaction may be due either to a decrease in the capacity of the liver to inactivate the hormone, to a hypersensitivity of the receptor cells, or to an increase in the number of cells.

5873 A COMPARATIVE CLINICAL STUDY OF ALKALINE PHOSPHATASE ISOENZYMES AND SERUM 5'-NUCLEOTIDASE IN HEPATOBILIARY DISEASE: 544 COMBINED DETERMINATIONS. (Fre.) Metman, E. H. (C.H.U., Tours, France). *Rev. Fr. Gastroenterol.* (107):7-10, 13-16, 19-22; 1975.

Serum of 424 patients with various hepatic and biliary pathologies was examined to compare alkaline phosphatase and 5'nucleotidase enzymes. Automatic spectrophotometric determination was used for the former, and a method using differential inhibition with nickel for the latter. Controls numbered 60. Results show for alkaline phosphatase and 5'nucleotidase, resp., percentages of 100% and 90% in extrahepatic retentional jaundice, 100% and 100% in cancer of the bone and liver, 100% and 100% in intrahepatic cholestasis, 83% and 60% in cytolytic viral hepatitis, 82% and 73% in primary or secondary cancer of the liver, 80% and 80% in nonalcoholic cirrhosis, 85% and 20% in bone pathologies, 15% and 27% in alcoholic subjects, 62% and 50% in cirrhosis, 71% and 45% in cirrhosis with jaundice, 32% and 37% in diabetes, 48% and 44% in other pathologies, and 51% and 45% in other cancers. These results support the parallel rise of both enzymes in hepatic and biliary pathologies and the absence of a rise in 5'nucleotidase in bone pathologies. In extrahepatic obstructions, 10% of cases had normal 5'nucleotidase but an elevated alkaline phosphatase. A good correlation was found between the latter enzyme and jaundice in cirrhosis. On the other hand, 5'nucleotidase was more accurate an indicator in chronic alcoholism. In diagnosis, the enzymes must complement each other as the hepatic selectiveness and greater sensitivity of 5'nucleotidase is accompanied by less cholestatic specificity.

5874 ALPHA FETOPROTEIN IN LIVER DISEASE IN PAPUA NEW GUINEA. (Eng.) Woodfield, D. G.; Endo, Y.; Clarke, C. (Red Cross Blood Transfusion Service, P.O. Box 1174, Boroko, Papua, New Guinea). *Aust. N.Z. J. Med.* 6(2):117-120; 1976.

The sera of 112 patients with proven liver disease, 84 normal blood donors, 69 healthy village subjects, and 30 patients without liver diease were analyzed for alpha fetoprotein (AFP) by radioimmunoassay. All of the 84 blood donors had AFP values within the normal range; in the remaining 99 subjects without liver disease, 9% had elevated AFP levels, but in only one case did the level exceed 400 ng/ml. Of 23 patients with viral hepatitis, the AFP level exceeded 20 ng/ml in 25%, and in 3 patients, the level exceeded 400 ng/ml. None of these patients had a positive immunodiffusion test for AFP. Of 18 patients with cirrhosis, 72.2% had elevated AFP values; one-third of the 18 patients had values above 400 ng/ml. One cirrhotic patient had a positive immunodiffusion test. In 31 patients with primary liver cell carcinoma, the AFP levels were raised in 96.8%. Twenty-six of the 31 patients also gave positive results by immunodiffusion testing. The AFP level was raised in 20% of 20 patients with liver disease and with normal liver histology. In 5 of 20 patients with nonspecific liver changes, the level was raised. The results indicate that elevated AFP levels are found in various liver diseases, but particularly in primary liver cell carcinoma.

5875 SIGNIFICANCE OF ALPHA-FETOPROTEIN DETERMINATIONS IN PATIENTS WITH LIVER DISEASES. (Ger.) Lamerz, R.; Schmalhorst, U.; Grunst, J.; Fateh-Moghadam, A.; Eisenburg, J. (I. Med. Univ.-Klinik, Ziemssenstrasse 1, Munich, W. Germany). *Fortschr. Med.* 94(12):702-710; 1976.

An alpha-fetoprotein (AFP) radioimmunoassay technique of improved sensitivity was developed and employed in the examination of patients with various liver diseases. Immunologically pure AFP was administered to rabbits to produce high-titer monospecific anti-AFP sera. The purified AFP and the corresponding antibody were employed in a competitive radioimmunoassay, according to the double antibody method. Serum AFP levels were below 5 ng/ml in 121 of 140 normal sera, and between 5 and 14 ng/ml in the other 19. Of 18 patients with primary hepatocellular carcinoma, 7 had serum AFP levels above 10,000 ng/ml (i.e., in the Ochterlony-positive range), 7 had levels between 1,000 and 7,000 ng/ml, 3 showed moderate elevations at 21-120 ng/ml, and a normal serum AFP level was seen in 1 patient 2 yr after tumor resection. Other clinical-chemical parameters were not correlated with AFP levels nor were the size or extent of the tumor in the six cases in which autopsies were performed. Normal serum AFP levels were determined in 9 of 15 patients with liver metastases, and moderately elevated levels of up to 111 ng/ml were seen in the other 6 patients. Serum AFP levels below 20 ng/ml were found in 90 of 102 liver cirrhosis patients, and elevated levels (up to 134 ng/ml) were seen in 12 cases. Early hepatoma was suspected in three cirrhosis patients with AFP levels above 1,000 ng/ml, and was later confirmed. Transient AFP increases of 20-238 ng/ml were seen in 32% of the cases in the early stage of acute hepatitis, while 65% of the patients displayed values within this range at some time during follow-up (performed in 31 cases). Similar results were seen in three of seven cases of chronic hepatitis. Maximum AFP levels were developed 5-18 days after the maximum transaminase activities and coincided with a decrease in cholinesterase levels. Radioimmunologic AFP determinations in liver cirrhosis may permit early recognition of developing primary liver carcinoma.

5876 VALUE OF DETERMINATION OF THE GAMMA-GLUTAMYLTRANSPEPTIDASE (G.G.T.) ACTIVITY IN HEPATOBILIARY PATHOLOGY. REPORT OF OVER 5,000 DETERMINATIONS. (Fre.) Lafargue, P.; Couture, J.-C.; Ponsot, P. (Hopital Percy, 101 avenue H. Barbusse, F 92141 Clamart Cedex, France). *Nouv. Presse Med.* 5(27):1697-1698; 1976.

The determination of the serum activity of gamma-glutamyltranspeptidase (GGT) is of diagnostic use in cholestatic syndromes. However, only values greater than 90 mIU/ml are significant. Variations in GGT activity are as sensitive and more specific than those of alkaline phosphatase, more sensitive and as specific as those of leucine aminopeptidase, and as sensitive, specific, and early as those of 5'-nucleotidase. Abnormally high or rising GGT values may indicate primary or metastatic hepatic cancer justifying the repetition of hepatic scintigraphies. GGT activity can reveal alcohol as a cause of liver intoxication, especially at precirrhotic stages.

5877 THE BIOCHEMICAL PATHOLOGY OF LIVER CELL NECROSIS. (Eng.) Farber, J. L.; El-Mofty, S. K. (Temple Univ. Health Sciences Center, 3400 North Broad St., Phila., PA 19140). *Am. J. Pathol.* 81(1):237-250; 1975.

The biochemical pathology of liver cell death is reviewed, and a hypothesis based on a galactosamine-induced liver cell necrosis is presented. Many forms of severe liver cell damage are unaccompanied by necrosis, such as ethionine poisoning or low doses of galactosamine. Studies with puromycin, cycloheximide, and tenuazonic acid indicate that inhibition of protein and RNA synthesis is not associated with cell death, and that liver cells can tolerate low ATP levels, accumulation of fat, and disturbances in ion transport for many hours. Mitochondria and lysosomes have been ruled out as primary targets for the molecular mechanisms of cell death by studies of the time course of damage to these organelles after cell poisoning. Evidence indicates that one of the earliest events of cell death by carbon tetrachloride is a destructive attack on the cell membranes, followed by an increase in the calcium content. Membranes from hepatocytes are abnormal 3 hr after administration of dimethylnitrosamine. These and other studies have shown that the plasma membrane and its presumed role in maintaining a proper Ca^{++} balance is the primary site of irreversible hepatocyte damage. Galactosamine damage was used as a model to study hepatocyte death in rats. Membranes from rats given a low dose of galactosamine (200 mg/kg) were normal, but those from rats given a high dose (400 mg/kg) showed a 40% reduction in specific activity of 5'-nucleotidase and a twofold increase in the maximum negative ellipticity, determined by circular dichroism, as early as 2 hr after administration. Galactosamine membrane damage fulfilled criteria for a causal relationship to cell death, in that it was dose-dependent and reversible by uridine, in parallel with uridine's ability to prevent cell death. Loss of responsiveness to uridine coincident with loss of reversibility distinguished membrane changes from other biochemical disturbances and suggested that the plasma membrane may be the primary target. Changes in the calcium concentration were dose-dependent, rising between the second and third hours after administration in rats given the high dose, and falling in those given the low dose. Calcium increase was prevented by uridine until 2.5 hr after administration of galactosamine. It is proposed that galactosamine produces a deficiency of uridine nucleotides, uridine diphosphate-hexoses, and increased uridine diphosphate-hexosamines, which lead to injury of the plasma membrane and increases in Ca^{++} concentration. At 2.5 hr after administration, the injury becomes irreversible and leads to cell death.

5878 DISSEMINATED INTRAVASCULAR COAGULATION AND HEPATIC NECROSIS: COMPLICATIONS OF INFECTIOUS MONONUCLEOSIS. (Eng.) Pelletier, L. L., Jr.; Borel, D. M.; Romig, D. A.; Liu, C. (Univ. Kansas Sch. Medicine, Kansas City, KS 66103). *JAMA* 235(11): 1144-1146; 1976.

The case of a 48-yr-old man, who died from disseminated intravascular coagulation (DIC) and hepatic necrosis complicating infectious mononucleosis, is reported. The patient presented with fever, malaise, dyspnea, anasarca, and orthopnea, for which he was treated with ampicillin, and later with dexamethasone sodium phosphate. The symptoms recurred after this therapy was discontinued; progressive jaundice, somnolence, and petechiae developed. A necrotic white membrane in the pharynx, hepatosplenomegaly, and generalized lymphadenopathy were also present. During the 4 hospital days before his death, therapy consisted of a continuous i.v. infusion of heparin sodium (750 or 375 U/hr); methylprednisolone (125 mg/8 hr); plasma, platelet, and RBC transfusions; gentamicin sulfate; and clindamycin hydrochloride hydrate. Autopsy revealed extensive cutaneous and serosal petechiae, intra-alveolar hemorrhage into the left upper lobe of the lung, recent bleeding into the soft tissues of the pelvis, and blood within the gastrointestinal tract. A diffuse vasculitis involved the veins and venules of the uvula, tonsils, testes, lymph nodes, and spleen. Large numbers of arteriolar and capillary fibrin thrombi occurred in the liver, lymph nodes, heart, renal glomeruli, and spleen. The liver was enlarged, and intravascular fibrin thrombi were present within nearly every hepatic portal space and periportal sinusoid. There was extensive confluent periportal coagulative necrosis and degeneration, with necrosis of interlobular bile ducts and cholangioles, associated with moderate infiltration of the periportal areas of atypical lymphocytes. The relative lack of cellular infiltration of the liver and the generalized lymphoid atrophy may reflect the lympholytic effect of the administration of high doses of adrenal corticosteroids. The presence of DIC and the remarkable extent of intravascular fibrin deposition in the liver suggest that liver necrosis may have resulted from hepatic infarction produced by the intravascular thrombi formed in response to a generalized vasculitis.

5879 THE LIVER AND DEFICIENCY IN ALPHA-1-ANTITRYPSIN. (Fre.) Traissac, F.-J.; Paccalin, J.; Terme, R. (No affiliation given). *Bordeaux Med.* 8(10):1191-1198; 1975.

The association between a genetic deficit in serum α_1-antitrypsin (AAT), which is expressed in the phenotype protease inhibitor zero (PIZZ), and either pulmonary diseases (panlobular emphysema), hepatic diseases (infantile cirrhosis, neonatal hepatitis, cirrhosis and hepatic fibrosis, primary liver cancer), or both was examined, and its specific anatomopathologic signs reviewed. Conventional microscopy shows a reduced number of ribosomes on the endoplasmic reticulum in the hepatocyte. The endoplasmic reticulum is dilated due to the accumulation of globules, which are secreted by the ribosomes and which are antigenically like AAT. The endoplasmic reticulum appears normal in the absence of these agglomerates. The accumulation of such globules is not pathogenic in itself, as it sometimes occurs in normal cells, but here the globules are not excreted normally from the hepatocyte. The anomaly probably lies in the hydrocarbon portion of the molecule, which is crucial in transport mechanisms. Sialic acid may not bind normally either, because of the malformation of a protein chain or because of the dysfunction of a glycosyltransferase.

5880 ALPHA 1 ANTITRYPSIN DEFICIENCY IN CHILDREN: ULTRASTRUCTURE OF THE LIVER AND SPECULATIONS. (Fre.) Scotto, J. M.; Stralin, H. G.; Alagille D. (U-56 INSERM, Hopital de Bicetre, F-94270 Le Kremlin Bicetre, France). *Virchows Arch. [Pathol. Anat.]* 369(1):19-27; 1975.

Twelve children with liver diseases associated with a PiZZ phenotype alpha 1 antitrypsin serum deficiency underwent hepatic biopsies. Samples were studied by electron microscopy. A homogeneous material was found in some hepatocytes of all samples. Deposits of this material in the perinuclear spaces of the hepatocytes caused intranuclear invaginations, but more was observed in the lumens of the endoplasmic reticulum. There were occasional groups of ribosomes attached to the smooth and rough reticular membranes surrounding other sites of deposit, however, the smooth endoplasmic reticulum appears directly implicated in the depositing process. With regard to the PiZZ phenotype, the abnormal substance seems to be a form of normal alpha 1 antitrypsin, deprived of sialic acid, and the disorder may result from imperfect synthesis of a glycoprotein. The ultrastructural data observed does not corroborate biochemical studies, which situate the first binding steps of the monosaccharide residues at the level of the rough endoplasmic reticulum.

5881 BONE METASTASES REVEALING HEPATOMA. REPORT OF SIX CASES. (Fre.) Joubaud, F.; Ben Bouali, A.; Cheguillaume, J.; Minier, J.-F.; Lavenet, C. (No affiliation given). *Ouest Med.* 28(16):1139-1142; 1975.

A study is presented of six patients (5 men and 1 woman, median age 59 yr) with bone metastases revealing primary hepatomas. While three patients had liver function evidence of cirrhosis, there was no clinical data to help determine the etiology of the metastases in the other three. Initial clinical symptomatology was marked by bone fractures in two patients, and by pains in the vertebral column in four. Biological examinations were basically normal and functional hepatic exploration uninformative. However, radiology was useful in confirming the metastases and defining their location. Scintigraphic exploration of the liver with double markers (^{99m}Tc and ^{75}Se) diagnosed the primary hepatoma.

5882 MINIMAL DEVIATION HEPATOMA: A NEW ENTITY. (Eng.) Galloway, S. J.; Casarella, W. J.; Lattes, R.; Seaman, W. B. (Hosp. St. Raphael, 1450 Chapel St., New Haven, CT 06511). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1): 184-192; 1975.

The cases of four women (aged 30-67 yr) with liver tumors, only one of whom had a history of oral contraceptives, are presented. The authors suggest the term minimal deviation hepatoma (MDH) to describe these tumors, which have been previously call hemartoma, adenoma, and benign hepatoma. None of the women had a history of liver disease. Angiographically, lesions which were hypervascular had large feeding arteries, which began peripherally in the mass and coursed centripetally toward the center. Permeating neovascularity, which is seen in malignant hepatomas, was not observed. The lack of venous laking, arteriovenous shunting, and portal vein invasion distinguished these lesions from malignant ones. Other masses were principally avascular. Single and multiple nodules were seen. Each mass was well demarcated from adjacent normal tissue in the capillary phase of the angiogram. Some lesions were located deep in the liver substance, while others were subcapsular or pedunculated and were associated with subcapsular hematomas. The four cases presented here, and 19 previously reported cases, represent a distinct clinical and pathological entity. Clinically, the patients are usually female, young, with no known preexisting liver disease. Liver function studies are normal or minimally deranged. Fever indicates an underlying necrosis, and anemia may reflect blood loss. Hemorrhage and shock may occur with the rupture of a superficial mass. Usually, the presenting complaint is a falling hematocrit or an enlarging mass. Although hormonal influence has been implicated in these tumors, no causal relationship has been firmly established. Three of these cases represent the first report of MDH in women not taking oral contraceptives. Therapy should be directed toward limited resection of accessible lesions, as radical resection may carry a greater morbidity than may the lesion itself. Nonrestricted masses with cellular atypia may be given a trial of chemotherapy, with hope of regression and cure. Untreated lesions may rupture. When a previously healthy woman presents with a right upper quadrant mass, epigastric pain, a defect in the liver scan, or a hemoperitoneum, the diagnosis of MDH should be considered and verified by angiography.

5883 HEPATIC ARTERY LIGATION AND PROLONGED CYTOTOXIC THERAPY IN ADVANCED PRIMARY AND SECONDARY LIVER TUMOURS. (Eng.) Cuschieri, A.; Swain, C.; Crosbie, R. B. (Dept. Surgery, Univ. Liverpool, PO Box 147, Liverpool, L69 3BX, England). *Proc. R. Soc. Med.* 68(11):678-680; 1975.

Experience with hepatic artery ligation and infusion chemotherapy in the treatment of 17 patients with advanced hepatic malignancies is presented. The series included five patients with inoperable primary liver tumors (3 with hepatocellular carcinoma, 2 with cholangiocarcinoma) and 12 with massive secondary hepatic involvement (colorectal, 8; gastric, 1; adrenal, 1; unknown, 2). The output volume of the chemofusor used in the administration of 5-fluorouracil was 5.0 ml/24 hr, equivalent to a maximum daily dose of 250 mg. Infusion therapy was continued for 6 weeks. Four patients received a shorter course of treatment due to dislodgement of the catheter from the hepatic artery, while six patients received an additional course of methotrexate (500 mg over 10 days) at the end of the 6 weeks. There was only one postoperative death. Transient derangement of liver function, accompanied by fever and leukocytosis, was common in patients with metastatic disease. The preoperative serum bilirubin and alanine aminotransferase levels rose from 2.4 mg/100 ml and 122.0 IU/100 ml, resp., to 3.8 mg/100 ml and 1,070.6 IU/100 ml, resp., postoperatively, and the average WBC count rose from 7,800/mm^3 before surgery to 16,700/mm^3 after surgery. These changes largely subsided within 14 days of surgery. Six patients with metastatic disease showed an objective response to treatment and experienced relief of pain. The mean survival was 9.0 months for these patients and 2.2 months for the other patients with metastatic disease. Survival ranged between 4 weeks and 18 months in the patients with primary hepatoma. Two patients died from massive tumor pulmonary emboli within the first 5 weeks after surgery. The results suggest that hepatic artery ligation and prolonged infusion chemotherapy may provide worthwhile palliation to patients with advanced hepatic malignancy.

5884 EVALUATION OF SCLEROSING CHOLANGITIS BY ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY.

(Eng.) Ruskin, R. B.; Katon, R. M.; Bilbao, M. K.; Smith, F. (Hayward California Permanente Medical Group, Hayward, CA). *Arch. Intern. Med.* 136(2):232-235; 1976.

Two cases of sclerosing cholangitis, with a biliary tree well visualized by endoscopic retrograde cholangiopancreatography (ERCP), are described. In the first patient, a 43-yr-old man with long-standing biliary tract disease, sclerosing cholangitis was diagnosed after T-tube cholangiography and histologic examination of a liver biopsy specimen. Because of a rising serum alkaline phosphatase value and pruritus, the progress of the disease was assessed by ERCP 2 yr after the initial diagnosis. The retroduodenal portion of the common bile duct was substantially narrowed and beaded. Above the duodenum, the major ducts were dilated. The intrahepatic branches were narrow and irregular. These abnormalities were slightly more severe than those observed 2 yr previously, but were considered indistinguishable from differences that were caused by the degree of distention. In the absence of clinical, histologic, or definite cholangiographic progression during the previous 2 yr, surgical intervention was not indicated. One year later, the patient was again evaluated by ERCP because of increasing fatigue, pruritus, and conjugated hyperbilirubinemia. An unmistakable progression of both the narrowing of the retroduodenal bile duct and the dilatation above was demonstrated; a choledochojejunal shunt was successfully performed. In the second patient, a 46-yr-old man, ERCP showed a striking, irregular narrowing of the common bile duct that emptied into a deformed duodenal diverticulum. There were multiple irregular stenoses and saccular dilatations of the major hepatic ducts; the intrahepatic ducts were diffusely narrowed and irregular. The gallbladder appeared normal. These findings were consistent with sclerosing cholangitis or bile duct carcinoma, and exploratory laparotomy was performed. Cholecystoduodenostomy was done, and histologic examination confirmed the diagnosis of sclerosing cholangitis. When intrahepatic involvement is present, ERCP may provide the only means for following the course of this disease short of laparotomy.

5885 BENIGN POSTOPERATIVE INTRAHEPATIC CHOLESTASIS

(Fre.) Najman, A. (Hopital Saint-Antoine, 184, rue du Faubourg-Saint-Antoine, F 75571 Paris Cedex 12, France). *Nouv. Presse Med.* 4(43):3073-3074; 1975.

A hemophiliac, who had suffered a fall, developed a large hematoma on his right side and right lumbar region. When the liver receives a massive and sudden dose of bilirubin, as can be caused by a massive hematoma, clinical symptoms can be identical to those of a benign postoperative intrahepatic cholestasis. The patient also developed jaundice, caused by a massive overload of bilirubin in the liver (600 mg/l total bilirubin in the blood, 60 mg/l free bilirubin). Conjugation continued normally; there were no mechanical obstacles in the bile ducts. There was a temporary hepatic functional disability (transitory prothrombin deficiency). Within a month, the patient recovered with repeated blood transfusions.

5886 CHRONIC PRIMARY INTRAHEPATIC CHOLESTASIS: PATHOLOGY STUDY OF 11 PATIENTS.

(Fre.) Baglin, A. C.; Lemaigre, G.; Abelanet, R.; Galian, P. (C.H.U. Cochin, Port-Royal, Paris). *Ann. Anat. Pathol. (Paris)* 20(1):57-73; 1975.

Eleven women (average age, 44.5 yr) with apparent primary chronic intrahepatic cholestasis underwent surgical biopsy. Results showed two distinct histological groups. In the first group (3 patients), lesions were disparate, aspecific, and difficult to define. In the second (8 patients), the lesions were stereotyped. They were epithelial and segmentary lesions of the biliary canals, accompanied by characteristic but variable cell infiltrates. These lesions evolved into mutilating sclerosis with progressive loss of inflammatory lesions. Antimitochondrial antibodies were frequently associated with the histology observed in the second group. Clinical symptoms were also similar in the second group of patients and included severe pruritus, followed by early or late icterus, asthenia, and hepatomegaly. Death ensued 5-7 yr after onset of disease despite corticoid and chloraminophen therapy.

5887 EFFECT OF DIALYSIS OF MEDIUM-SIZED MOLECULES ON ENCEPHALOPATHY IN THE COURSE OF COMA DUE TO ACUTE HEPATIC ATROPHY: PRELIMINARY RESULTS.

(Fre.) Opolon, P.; Lavallard, M. C.; Crubille, C.; Gateau, Ph.; Nusinovici, V.; Granger, A.; Darnis, F.; Caroli, J. (Service d'exploration neurophysiologique, C.H.U. St-Antoine, France). *Med. Chir. Dig.* (Suppl. 2):37-41; 1975.

Cerebral function was studied in 11 patients with acute hepatitis in a state III (1) or IV (10) coma treated by hemodialysis with a polyacrylonitrile membrane to remove medium size molecules. Sessions were daily or every 2-3 days over a period of 30 days, and they usually were initiated 2-48 hr after onset of coma. Supportive treatment consisted of glucose antacids, lactulose, and blood transfusions. Furosemide, 20-40 mg, i.v., was administered as required to maintain adequate diuresis. Brain death occurred in four patients before the end of the series of dialysis treatments. Of the remaining seven patients, five completely regained consciousness and two partially regained consciousness for a period of 24 hr to recovery. Death as a result of massive hepatic destruction occurred in five of seven patients who benefited from hemodialysis; two survived more than 40 days after onset of illness (1 survived with a persistent hepatitis for 8 months). Hemodialysis was sometimes beneficial in the cases of massive hepatic destruction and in aged patients. Plasma concentrations of amino acids before and after dialysis as well as dialysate concentrations are tabulated.

5888 ASPECTS OF BILE ACID METABOLISM IN CYSTIC FIBROSIS.

(Eng.) Goodchild, M. C.; Murphy, G. M.; Howell, A. M.; Nutter, S. A.; Anderson, C. M. (Inst. Child Health, Univ. Birmingham, Francis Road, Birmingham B16 8ET, England). *Arch. Dis. Child.* 50(10):769-778; 1975.

Bile acid metabolism was investigated in 29 cystic fibrosis (CF) patients and 4 non-CF patients with pancreatic enzyme insufficiency to relate bile acid findings in feces, duodenal fluid, and serum to the liver disease and steatorrhea of CF. Three-day-old fecal collections from all patients were analyzed for fat and total bile acid content. Serological liver function tests were performed on all patients, and duodenal and serum bile acid studies were made by intubation at the time of investigation of pancreatic function. There was a significant increase in CF 3-alpha-hydroxy fecal bile acid values (47.6 ± 37 μmol/kg/24 hr) compared with controls (18.0 ± 2.8 μmol/kg/24 hr, $p<0.001$). Eighteen of the 29 CF patients had fecal bile acid values greater than the mean for the control group. Two of the four non-CF patients with pancreatic enzyme insufficiency also had raised fecal bile acid excretions. Fecal fat excretions were 20.3 ± 11.3 g/24 hr for the CF patients, 3.0 ± 1.0 for the control subjects ($p=0.001$), and 11.3 g/24 hr for the four non-CF patients. No correlation was found between fecal bile acid and fecal fat excretion for either of the two patient groups or for the controls. Fecal bile acid excretion showed an inverse relation with age in the CF patients, but not in the control subjects. The CF patients with overt liver disease tended to have the lowest fecal bile acid values. Duodenal aspiration in five CF patients and in one non-CF patient with pancreatic enzyme insufficiency (Shwachman-Diamond syndrome) produced very small fluid volumes. Duodenal fluid mean total bile acid concentrations were within normal limits. Estimation of serum bile acids in these six patients showed that three had raised bile acid values. Fecal analysis confirms previous findings of increased fecal bile acid loss in CF.

5889 EFFECTS OF KETO ANALOGUES OF ESSENTIAL AMINO ACIDS IN PORTAL-SYSTEMIC ENCEPHALOPATHY.

(Eng.) Maddrey, W. C.; Weber, F. L., Jr.; Coulter, A. W.; Chura, C. M.; Chapanis, N. P.; Walser, M. (Johns Hopkins Hosp., 601 N. Broadway, Baltimore, MD 21205). *Gastroenterology* 71(2):190-195; 1976.

The efficacy of using α-keto analogues of amino acids in the management of patients with portal-systemic encephalopathy was evaluated. Keto analogues of five essential amino acids (valine, leucine, isoleucine, methionine, and phenylalanine) were given either i.v. or p.o. in varying proportions to 11 patients with portal-systemic encephalopathy and hyperammonemia. When the sodium salts of these acids, plus L-histidine, L-threonine, L-tryptophan, L-lysine monohydrochloride, and L-arginine, were administered i.v., the doses were: 0.97, 1.29, 0.88, 1.27, 1.25, 0.50, 0.25, 0.54, 0.80, and 0.00 for sodium α-keto-isovalerate, sodium α-ketoisocaproate, sodium α-keto-β-methylvalerate, sodium α-keto-β-methylthiobutyrate, sodium phenylpyruvate, L-threonine, L-tryptophan, L-histidine, L-lysine, and L-arginine, resp. For p.o. administration, the branched chain keto analogues were given in 3-4 times greater quantities; the other analogues were given in 1.5 times the amounts in the i.v. solution. Plasma concentrations of amino acids corresponding to the infused analogues, including alloisoleucine, increased significantly after infusions. Plasma tyrosine and glycine, which were abnormally elevated in control samples, fell after the infusions. After one to five daily infusions, the ratio of essential to nonessential amino acids in fasting plasma was increased toward normal, suggesting improved protein nutrition. Arterial blood ammonia and glutamate did not change immediately after infusions, but a 42% decrease in glutamine was observed. Eight nitrogen balance studies performed in five patients during 3-12 days of p.o. or i.v. keto acid therapy failed to show consistent improvement in balance as compared with control periods. After five courses of p.o. therapy, there was again significant improvement in the ratio of essential to nonessential amino acids. No toxicity from keto analogue administration was found, and clinical improvement, as assessed by mental status and psychological testing, occurred in 8 of 11 patients. These studies suggest keto analogues of essential amino acids are converted to the corresponding amino acids in patients with portal-systemic encephalopathy, and that such therapy may be beneficial.

5890 A DOG MODEL OF FULMINANT HEPATIC FAILURE PRODUCED BY PARACETAMOL ADMINISTRATION.

(Eng.) Gazzard, B. G.; Hughes, R. D.; Mellon, P. J.; Portmann, B.; Williams, R. (King's Coll. Hosp., London SE5, England). *Br. J. Exp. Pathol.* 56(5): 408-411; 1975.

In an attempt to produce an animal model of fulminant hepatic failure caused by paracetamol overdose, different doses of paracetamol were administered to dogs. All animals given 3 g/kg paracetamol (3 dogs) or 1 g/kg (6 dogs) p.o. became unconscious and cyanosed and died 6-31 hr later. All animals had elevated aspartate aminotransferase (65-8000 IU/l) and arterial ammonia (155-340 μM) levels within 6 hr after receiving the lower dose of paracetamol. Only one dog had extensive hepatic necrosis at autopsy, while the others showed normal livers or minor abnormalities. Two dogs given 0.25 or 0.5 g/kg paracetamol, i.p., did not lose consciousness, and showed no evidence of liver damage when they were sacrificed 5 days later. The dogs that received 0.75 or 1 g/kg, i.p., became unconscious and cyanosed. Methemoglobinemia was detected in the four dogs in which it was measured; the two animals in which methemoglobinemia formed over 40% of the total hemoglobin died rapidly. Methemoglobinemia was associated with a reduction in the arterial partial pressure of oxygen (<5 kPa). In one dog in which 25% of the hemoglobin was present as methemoglobin, methylene blue (1 mg/kg) caused a temporary increase in the arterial partial pressure of oxygen from 5 to 7 kPa and a decrease in the percentage of methemoglobin. The extent of the hepatic necrosis and the time of survival following paracetamol administration were too variable for this model to be valuable in testing of new methods of temporary liver support.

5891 MULTINODULAR HEPATIC HEMANGIOMATOSIS: ITS FAVORABLE COURSE IN EARLY CHILDHOOD.

(Fre.) Verger, P.; Guillard, J. M.; Fontan, D.; Laigle, J. L. (Hopital des Enfants, 168, cours Argonne, 33000 Bordeaux, France). *Med. Chir. Dig.* 3(5):347-352; 1974.

Multinodular hemangiomatosis, as illustrated by the case history of a 7-month-old infant and 44 other cases from the literature, is clinically characterized by cutaneous angiomata, hepatomegaly, and cardiac insufficiency. The diagnosis is very difficult in the absence of cutaneous angiomata. The disease is frequently fatal, especially during the first 6 months of life when the infant can develop fatal cardiac failure. Diagnostic procedures include blood studies, radiography, intravenous urography, celiac arteriography, angiocardiography, hepatic scintigraphy, and laparotomy. Therapy is symptomatic. Radiotherapy is known to be effective although it can lead to secondary cirrhosis. Corticotherapy has produced good results after failure with radiotherapy. Spontaneous recovery does occur as in the case reported.

5892 TREATMENT OF ACUTE HEPATIC INSUFFICIENCY BY EXTRACORPOREAL LIVER PERFUSIONS.

(Fre.) Lenriot, J. P. (Hopital de Longjumeau, 91 Longjumeau, France). *Med. Chir. Dig.* (Suppl. 2):43-48; 1975.

Liver perfusions from homologous and heterologous sources were used to treat 53 patients (aged 5-63 yr, 64% were women) in a stage IV coma as a result of acute hepatic insufficiency of infectious (43), toxic (8), or gravid (2) origin. A total of 83 perfusions, lasting 45 min to 51 hr, were performed, and repeated up to five times in some cases. Source of the perfusion was pork (36), calf (13), baboon (4), or human (3). Long-term recovery of hepatic function occurred in 7 patients, and 13 came out of the coma but died shortly thereafter, usually as a result of a complication of the hepatic insufficiency. The remaining 33 patients died without regaining consciousness. Failures of the hepatic perfusions were mostly methodological, such as immediate or rapid alterations of the perfused liver, immune reactions, or complications such as metabolic acidosis, hypoglycemia, respiratory distress, and septicemia. Therefore, extracorporeal perfusion with baboon liver appears to be one of the least harmful techniques for treatment of acute hepatic insufficiency. However, hemodialysis appears likely to replace the perfusion technique.

5893 LIVER DISEASE WITH PERIPORTAL SINUSOIDAL DILATATION. A POSSIBLE COMPLICATION TO CONTRACEPTIVE STEROIDS.

(Eng.) Winkler, K.; Poulsen, H. (Kommunehospitalet, Oster Farimagsgade 5, 1399 Copenhagen K, Denmark). *Scand. J. Gastroenterol.* 10(7):699-704; 1975.

The case reports of four women (aged 15-48 yr) who developed moderate liver damage and hepatomegaly after long-term treatment with oral contraceptives are presented. At the height of clinical illness, all patients had a marked elevation of ESR (66-130 mm/hr), together with a moderate increase in serum gamma globulins and a slight decrease in serum albumin. In two patients, serum bilirubin was moderately elevated (maximum value 3.0 and 3.6 mg/100 ml, resp.). Serum aspartate aminotransferases were normal in one case, and moderately elevated in the others, while serum alkaline phosphatases were slightly to moderately increased in all four patients. Prothrombin was normal in three cases, but low (6%) in one case; it increased to normal values following K vitamin therapy. Liver histology showed a conspicuous periportal sinusoidal dilatation as the only abnormality. The clinical course of the liver damage was benign. The etiology and pathogenic mechanisms of these changes, which were localized predominantly to Rappaport's Zone I, are unknown. Hemodynamic studies revealed no abnormalities. A relationship between the described changes in liver histology and any etiologic agent or known pathogenic mechanism cannot be established. Before the relationship between liver damage and hormone therapy can be determined, an insight into the metabolic fate of these hormones and the influence of their metabolism on cells in different parts of the liver is necessary.

5894 JAUNDICE IN PREGNANCY.

(Fre.) Lhonneux, C.; Barbier, P. (Hopital Universitaire Saint-Pierre, Brussels, Belgium). *Acta Gastroenterol. Belg.* 37(12):511-519; 1974.

Jaundice in pregnancy is reviewed. There are certain jaundices that occur almost exclusively during pregnancy, such as acute steatosis of Sheehan, recurrent jaundice usually caused by oral contraceptives, jaundice as a complication of pregnancy vomiting, jaundice of eclampsia, hepatic rupture, or severe antirhesus isoimmunization. Viral hepatitis is the most frequent cause of jaundice coincidental with pregnancy. It can affect the liver of the fetus as fetal contamination by the Australia antigen is observed in 47% of hepatic jaundices appearing between the 8th month of pregnancy and the 2nd postpartum month. Less frequent is the association of jaundice and liver cirrhosis because of the usual age of cirrhotic patients. Jaundice can be related to intrahepatic cholestasis as a result of drug toxicity or extrahepatic cholestasis caused by lithiases or edema of the pancreas.

5895 LIPID CONTENT IN THE LIVER OF FATTY METAMORPHOSIS OF PREGNANCY. (Eng.)

Eisele, J. W.; Barker, E. A.; Smuckler, E. A. (Dept. Pathology, Case Western Reserve Univ., Cleveland, OH 44106). *Am. J. Pathol.* 81(3):545-560; 1975.

The anatomic changes and lipid composition of the liver of a 29-yr-old patient who died from acute fatty liver of pregnancy are reviewed, and a comparison is made with livers from normal subjects and from subjects with nutritional fatty livers. An autopsy was performed within 1 hr of death. External examination revealed marked icterus and multiple petechiae. The peritoneal cavity contained 950 cm^3 of unclotted blood and a large hematoma involving the lower uterine segment, the broad ligaments, and the anterior abdominal wall. There was a bilateral bronchopneumonia, an erosive esophagitis, and multiple petechiae of the gastric and duodenal mucosa. Microscopically, the hepatic architecture was intact, although many of the lobules appeared shrunken. Occasional areas of focal cell loss consisting of hepatocellular dropout or eosinophilic necrosis were scattered through the lobules. The hepatocytes were distended, with small cytoplasmic vacuoles. There was an infiltration of neutrophils, lymphocytes, and macrophages. Bile pigment was present within hepatocytes, Kupffer cells, and some canaliculi. Small fat globules were also present in the cytoplasm of some of the renal proximal tubular cells, but fat was not detected in other organs. There were marked increases in free fatty acids in fatty liver of pregnancy (250 µmol lipid/g liver) and in triglycerides in nutritional fatty liver (220 µmol lipid/g liver). In neither instance could the change be the result of autolytic modification, since identical treatment of a normal liver was not associated with changes of similar magnitude. These results indicate that in fatty liver of pregnancy, the increase in hepatic lipids is in the form of free fatty acids. This contrasts with nutritional fatty liver, in which the increase is in the form of triglycerides.

5896 COPROPORPHYRIA: SEVEN CASES. (Fre.)

Jaeger, A.; Tempe, J. D.; Geisler, F.; Nordmann, Y.; Mantz, J. M. (Service de Reanimation medicale, Pavillon Pasteur, C.H.U., F 67000 Strasbourg Cedex, France). *Nouv. Presse Med.* 4(39):2783-2787; 1975.

Two cases of hereditary porphyria (44- and 38-yr-old women) with peripheral paralysis and severe respiratory failure are reported. While the outcome was fatal in one case (adenosine monophosphate was ineffective), the other patient slowly recovered although abdominal pains remained intermittent despite treatment with chlorpromazine and atropine. Two latent asymptomatic cases (2 of 8 children) were found in the family of the first patient (study of 12 of 30 members) and three diagnosed cases (father, sister, and brother) in the family of the second (8 members). The literature contains 86 cases of coproporphyria in a total of 25 families; only 32 individuals presented a clinical symptomatology while the others were carriers. Transmission of the disease is autosomal dominant. The expression of coproporphyria is weak as clinical signs in more than one member of a family have only been observed in six families. Hereditary porphyria resembles acute intermittent porphyria clinically although its biological characteristics are distinctive. Excretion of coproporphyrins in the urine and especially in the feces is massive while the excretion of porphobilinogen and delta-amino-levulinic acid is only slightly increased. Contrary to mixed porphyria, the fecal excretion of protoporphyrins is normal. Coproporphyria is usually benign but is sometimes fatal due to severe neurorespiratory complications. Treatment is symptomatic and preventative. Triggering factors, such as certain drugs (barbiturates, tranquilizers, anti-epileptics, estrogens, and antidepressors), must be avoided and latent carriers carefully sought in the families of affected individuals.

5897 MORPHOLOGICAL CHANGES IN THE LIVER AND ITS VESSELS IN SYSTEMIC SCLERODERMA.

(Rus.) Skorodumova, N. P. (Chair Pathology Anatomy, Donetsk Medical Inst., Donetsk, USSR). *Vrach. Delo* (4):34-39; 1975.

Thirteen of 25 patients with systemic scleroderma were found at autopsy to have had liver involvement. Liver tissues from these patients were examined by light microscopy to determine morphological changes and the clinical course of the disease. Liver enlargement was seen in a majority of cases; in two patients, the liver weighed 1,400-1,500 g; in five patients, it was 1,400-1,600 g; and in six patients, the liver weighed 1,900-2,400 g. Fibrosis of the portal tracts, perivascular fibrosis and sclerosis of the ducts, abundant mononuclear infiltration, and sometimes, cirrhosis were observed in the stroma. The parenchyma showed small- and large-drop fatty dystrophy, centrilobular necrosis, and hemorrhagic foci. Small and medium sized hepatic blood vessels showed sclerosis of the walls, in association with signs of disorganization (fibrinoid swelling, hyalinosis, and amyloidosis). Proliferative arteritis was seen in the hepatic artery.

Changes of the portal and hepatic veins were similar, and consisted of mild edema, defibering, and moderate sclerosis of the intima and adventitia.

5898 ANGIOGRAPHIC FINDINGS IN PRIMARY BILIARY HEPATIC TUBERCULOSIS. (Fre.) Remond, A.; Capron, J. P.; Henry, X.; Pietri, J.; Trinez, G. (C.H.U., F 80000 Amiens, France). *J. Radiol. Electrol. Med. Nucl.* 57(1):7-11; 1976.

Arteriography was used to diagnose primary micronodular hepatic tuberculosis in two men, aged 22 and 28 yr. Case reports including results of clinical studies, laparotomy, radiography, etc., reflect the difficulty of accurate diagnosis of the disease entity. Selective hepatic arteriography revealed normal anatomical distribution of the arteries; however, abnormalities appeared in the distal arterioles. Small, nodular, irregular formations were opacified encircling the arterioles. No abnormalities of the hepatic or portal veins were observed. Liver parenchyma in the vicinity of the arterioles appeared normal and homogeneous. Arteriography can distinguish micronodular tuberculosis from other hepatic pathologies, such as focal nodular hyperplasia, hemangioma, and neoplasm metastasis.

5899 HEPATIC VENO-OCCLUSIVE DISEASE: NOSOLOGY AND DIAGNOSTIC DIFFICULTIES. (Fre.) Barge, J.; Carbon, Cl.; Lamotte-Barrillon, S. (Laboratoire Central d'Anatomie Pathologique, Hopital Louis-Mourier, 178, rue des Renouillers, 92701 Colombes Cedex, France). *Sem. Hop. Paris* 52(16):1023-1025; 1976.

The case of a 42-yr-old man with chronic hepatic venoocclusive disease is reported. The cause of the symptoms of chronic liver disease was difficult to determine as the exterior of the liver appeared intact. Histological examination revealed extensive fibrosis of the hepatic venous system. Chronic hepatic venoocclusive disease should be suspected when no etiological factor can be found, and when a hepatic puncture biopsy does not reveal nodular regeneration (suggestive of an uncompensated cirrhosis). Identification of the venous lesions is not always possible because arteriography of the vena cava is difficult to interpret. The disease is usually rapidly fatal; the patient studied died of pulmonary embolism.

5900 TREATMENT OF ACUTE HEPATOCELLULAR INSUFFICIENCY BY CROSSED CIRCULATION WITH HUMANS OR BABOONS: TEN PERSONAL OBSERVATIONS. (Fre.) Muller, J. M.; Guignier, M.; Guillaud, J. Y.; Pircher, C.; Brambilla, C.; Hernandez, J. L.; Hohn, C. (Centre Hospitalier Regional de Grenoble, 38 700 La Tronche, France). *Med. Chir. Dig.* (Suppl. 2):29-32; 1975.

5901 CHARACTERISTICS OF THE CARBOHYDRATE METABOLISM IN CHILDREN WITH CHRONIC DISEASES OF THE HEPATOBILIARY SYSTEM. (Ukr.) Smiian, I. S.; Slobodian, L. M.; Khodorchuk, N. Ia.; Babinets', T. S. (Ternopol Medical Inst., Ternopol, USSR). *Pediatr. Akush. Ginekol.* 37(4):17-19; 1975.

5902 CERTAIN INDICES OF THE FUNCTIONAL STATE OF THE STOMACH IN CHILDREN WITH LIVER AND BILE DUCT DISEASES. (Ukr.) Chobotar'ova, V. D.; Revunova, O. M.; Khalfina, A. L. (Kiev Medical Inst., Kiev, USSR). *Pediatr. Akush. Ginekol.* 37(4):15-17; 1975.

5903 HEPATIC TRANSPLANTS. (Ita.) Salerni, B. (Clinica Chirurgia Generale, Universita Cattolica de Sacro Cuore, Rome, Italy). *Minerva Chir.* 30(17): 893-895; 1975.

5904 HUMORAL FACTORS OF CIRCULATORY DISTURBANCES IN CHRONIC LIVER DISEASE. (Rus.) Ivkov, V. G. (Kalinin Medical Inst., Kalinin, USSR). *Ter. Arkh.* 47:142-149; 1975.

5905 SIGNIFICANCE OF ENZYMATIC AND ANTITOXIC FRACTIONS OF THE LIVER IN MODERN HEPATOLOGY. (Fre.) Le Bras, M.; Bertrand, E. (Chaire de Clinique Medicale, Boite Postale 20.632, Abidjan, Ivory Coast). *Med. Afrique Noire* 22(7): 537-541; 1975.

5906 PORTOHEPATOGRAPHY IN THE DIAGNOSIS OF HEPATIC TUMORS. (Rus.) Granov, A. M.; Mikhailov, V. A.; Gelazoniia, R. V. (I. P. Pavlov First Leningrad Medical Inst., Leningrad, USSR). *Med. Radiol. (Mosk.)* 20(8):25-27; 1975.

5907 CERTAIN CLINICAL AND EXPERIMENTAL MORPHOLOGICAL CHANGES OF THE LIVER IN HYPOTHYROIDISM. (Rus.) Gasparian, E. I.; Sakanian, N. N. (Erevan Medical Inst., Erevan, USSR). *Zh. Eksp. Klin. Med.* 15(4):82-89; 1975.

5908 ACUTE LIVER NECROSIS AND LIVER TRANSPLANTATION. (Fre.) Bloch, P.; Huguet, C.; Opolon, P.; Conard, J.; Lavallard, M. C. (Hopital St-Antoine, 184, rue du Fg St-Antoine, 75012 Paris, France). *Med. Chir. Dig.* (Suppl. 2): 33-35; 1975.

5909 A LARGE HEPATOCELLULAR ADENOMA OF THE LIVER IN A 82-YEAR-OLD PATIENT (HISTOLOGICAL AND CYTOMETRIC DATA). (Rus.) Samsonov, V. A. (O. V. Kuusinen Petrozavodzk, Univ. Petrozavodsk, USSR). *Arkh. Patol.* 37(6):76-78; 1975.

5910 MAIN HEMATOLOGICAL COMPLICATIONS OF DISEASES OF THE LIVER. (Fre.) Gonzalez-Fonseca, M. (Residencia Sanitaria "Ntra. Sra. del

Pino," Las Palmas de Gran Canaria, Spain). *Union Med. Can.* 105(2):248-252; 1976.

5911 LIVER FUNCTION IN THE ANEMIA OF PREGNANCY. (Ukr.) Shamik, A. I.; Timoshenko, L. V. (Kiev Inst. Postgraduate Medicine, Kiev, USSR). *Pediatr. Akush. Ginekol.* 37(3):40-41; 1975.

5912 PYOGENIC ABSCESSES OF THE LIVER. (Spa.) de la Revilla, L.; Fernandez, A.; Marti, J.; Martinez, J.; de Federico, A.; Garcia-Torres, J. A. (Ciudad Sanitaria "Ruiz de Alda," Granada, Spain). *Rev. Exp. Enferm. Apar. Dig.* 46(3):285-306; 1975.

5913 ACUTE LIVER FAILURE IN A CHILD WITH VISCERAL STEATOSIS AND ENCEPHALOPATHY (REYE'S SYNDROME). (Fre.) Neimann, N.; Vidailhet, M.; Grun, Gh.; Alba, G. (Clinique de Pediatrie, 29, avenue de Lattre-de-Tassigny, 54039 Nancy, France). *Ann. Pediatr.* 22(3):195-202; 1975.

5914 STUDY OF THE SELECTIVE ANGIOGRAPHY OF STOMACH ORGANS: SPECIAL REFERENCE TO THE HEPATIC TUMOR. (Jpn.) Endo, Y. (Sch. Medicine, Kurume Univ., Japan). *Acta Medica* 45(1):63-89; 1975.

5915 SPONTANEOUS SUBCAPSULAR HEMATOMA OF THE LIVER IN A MALE PATIENT. (Fre.) Gautier-Benoit, C.; Delepouille, E.; Cecile, J.-P.; Houcke, M.; Vermesse, G. (Service de Chirurgie Generale, Centre Hospitalier, F 62302 Lens, France). *Arch. Fr. Mal. Appar. Dig.* 64(6):535-538; 1975.

5916 THE VALUE AND LIMITATIONS OF ECHOGRAPHY IN THE DIAGNOSIS OF ABDOMINAL LYMPHOMAS IN MALIGNANT DISEASES. (Ger.) Kratochwil, A.; Karcher, K.-H.; Jentzsch, K.; Wolf, G. (II. Univ.-Frauenklinik, 1090 Wien, Spitalgasse 23, Austria). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 122(5):410-417; 1975.

5917 COMPARATIVE VALUE OF VARIOUS TESTS FOR DIAGNOSING CLOTTING DISORDERS IN LIVER DISEASE. (Fre.) Legre, M.; Sicardi, F.; Tronconi, J.-C.; Palayodan, A.; Boucher, J.; Blanc, M. (No affiliation given). *Arch. Fr. Mal. App. Dig.* 64(3):288; 1975.

5918 REYE'S SYNDROME OR AN ACUTE ENCEPHALOPATHY WITH POLYVISCERAL FATTY DEGENERATION (SYNTHESIS OF PRESENT KNOWLEDGE AND DESCRIPTION OF A PERSONAL CASE). (Ita.) Scorza, P.; Alessi, A.; Baroncelli, G.; Contarini, A.; Lombardi, S.; Miano, A.; Salvagiani, L.; Santini, G. F. (Ospedale Provinciale S. Maria delle Croci di Ravenna, Ravenna, Italy). *Clin. Pediatr. (Bologna)* 57(3):99-128; 1975.

5919 STUDY OF THE CONSERVATION OF CANINE LIVER BY ORTHOTOPIC HOMOTRANSPLANT. (Fre.) Rausis, C.; Mirkovitch, V.; Pexieder, M.; Robinson, J. W. L.; Mosimann, R. (Hopital cantonal universitaire, CH-1011 Lausanne, Switzerland). *Helv. Chir. Acta* 42(1/2):119-121; 1975.

5920 A CASE OF PERFUSION WITH HETEROLOGOUS LIVER. (Ita.) Zucchetti, F.; Butti, A. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica dell'Universita Cattolica del Sacro Cuore, Rome, Italy). *Minerva Chir.* 30(17):896-902; 1975.

5921 CLINICAL SIGNIFICANCE OF α-FETOPROTEIN. (Jpn.) Endo, Y.; Kanai, K. (Tokyo Univ. Sch. Medicine, Tokyo, Japan). *Jpn. J. Clin. Pathol.* 23(5):356-364; 1975.

5922 INVESTIGATION OF THE SPECIFICITY OF ALANINE AMINOPEPTIDASE AND ITS VARIATION IN THE SERUM OF PATIENTS WITH HEPATOBILIARY DISEASE. (Ger.) Huhnstock, J.; Peters, J. E. R. (Kreiskrankenhaus, 325 Stassfurt, Bodestrasse 11, Germany). *Z. Gesamte Inn. Med.* 31(2):43-47; 1976.

5923 LIVER RHABDOMYOSARCOMA IN CHILDREN: REPORT OF ONE CASE. (Fre.) Babut, J.-M.; Ferrand, B.; Bracq, H.; Feuillu, J.; Mention, J.; Lecornu, M. (Service de Chirurgie Infantile, C.H.U. 35000 Rennes, France). *Ann. Chir.* 30(3):251-255; 1976.

5924 LACTATE AND MALATE DEHYDROGENASE COENZYMES IN THE BLOOD SERUM IN CERTAIN DISEASES INVOLVING HEPATIC LESION. (Rus.) Zubikova, I. I.; Bokovoi, A. G.; Vaganov, P. D.; Uryvchikov, G. A.; Trakhtenberg, M. I. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Pediatriia* (3):63-64; 1976.

5925 THE AGE FACTOR AND THE PRESENCE OF PARAPROTEIN IN ACTIVE CHRONIC HEPATOPATHIES. (Cze.) Hrncir, Z.; Tichy, M.; Hrncirova, L. (II. interni klinika lekarske fakulty University Karlovy, 500 36 Hradec Kralove, Pospisilova trida, Czechoslovakia). *Cas. Lek. Cesk.* 115(24):735-736; 1976.

5926 CAVERNOUS HEMANGIOMAS OF THE LIVER. A REVIEW AND REPORT OF TWO CASES. (Dan.) Hermansen, K.; Mohammed, S. H.; Nellemann, G. (Odense sygehus, medicinsk afdeling C, Odense, Denmark). *Ugeskr. Laeger* 137(23):1253-1257; 1975.

See also, 5467, 5472, 5495, 5510, 5515, 5516, 5528, 5531, 5532, 5541, 5543, 5544, 5557, 5563, 5564, 5569, 5577, 5582, 5609, 5832, 5858, 5945, 5977, 5990, 5995, 5997, 6000, 6018, 6058, 6072, 6082, 6084, 6085, 6086, 6087, 6106, 6109, 6113.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

5927 GILBERT'S SYNDROME: RECENT DATA ON CLINICAL AND DIAGNOSTIC ASPECTS AND ON THE THERAPEUTIC APPROACH. (Ita.) Okolicsanyi, L.; Cortelazzo, S.; Orlando, R.; Benedetti, G.; Naccarato, R. (Istituto di Patologia speziale medica e metodologia clinica, Universita, Padova, Italy). *Recent. Prog. Med. (Roma)* 58(5):560-593; 1975.

Clinical, diagnostic, and therapeutic data on Gilbert's syndrome are reviewed. When exogenous bilirubin is administered i.v., a net deficit in pigment uptake is observed, even in cases where the plasma clearance of BSP is normal; such a deficit may be responsible for hyperbilirubinemia. A net decrease in the conjugation-excretion process of bile pigment is also observed in Gilbert's syndrome. The existence of a deficit in glucuronyl transferase is now accepted; this deficit is especially evident when the enzyme's activity is tested with bilirubin as the natural substrate. Two mechanisms that may be responsible for the hyperbilirubinemia in Gilbert's syndrome, an uptake deficit and a conjugation deficit, are thus confirmed.

5928 GILBERT'S SYNDROME. ACTION OF URIDINE DIPHOSPHATE GLUCOSE ON BILIRUBIN METABOLISM. (Fre.) Ventura, E.; Zeneroli, M. L. (Istituto di Clinica medica Geverde e Terapia medica dell'Universita di Modena, Modena, Italy). *Med. Chir. Dig.* 4(5/6):283-286; 1975.

Six patients with Gilbert's syndrome received uridine diphosphate glucose (UDPG), 100 mg, i.v. for 7 days. Plasma clearance and transfer of bilirubin into the microsomal compartment of the liver cell were measured after 2 mg/kg, i.v., of bilirubinic acid was administered 3 days before and 7 days after UDPG treatment was initiated. UDPG apparently increases glucuronoconjugation of bilirubin since the amount of bilirubin in the microsomal compartment of the hepatocytes increased significantly. A graph of plasma clearance of bilirubin after 7 days of UDPG treatment showed lower plasma levels, particularly from 1-4 hr, compared to the basal study. UDPG did not modify bilirubin uptake or hepatoplasma reflux. The results suggest that UDPG may be beneficial in the treatment of Gilbert's syndrome.

5929 STUDY OF THE KINETICS OF BILIRUBIN IN A CASE OF DUBIN-JOHNSON'S SYNDROME BEFORE AND AFTER TREATMENT WITH UDPG. (Ita.) Orlando, R.; Caregaro, L.; Muggeo, M.; Ghidini, O.; Okolicsanyi, L. (Istituto di Patologia Speciale Medica dell'Universita di Padova, Padova, Italy). *Clin. Ter.* 76(4):323-382; 1976.

A 47-yr-old patient with Dubin-Johnson syndrome was treated with uridine diphosphate glucose (UDPG, 80 mg/day, i.m., for 10 days). Plasma bilirubin clearance significantly accelerated. Passage of unconjugated bilirubin from the plasma to the hepatocytes increased, as did the intrahepatocytic passage of bilirubin from the compartment of unconjugated pigment to that of conjugated pigment. Reflux rate from the hepatocytes to the blood decreased. Total bilirubinemia was the same (2.43 mg%) before and after initial treatment; however, another 2 weeks of treatment lowered the levels to 1.19 mg%. Jaundice was attenuated. The results probably represent an activation of the postmicrosomial transport systems, perhaps through improved glycogen synthesis. However, a concomitant action of UDPG on the hepatocytic membrane should not be excluded.

5930 BLUE DOUBLE LIGHT: IMPROVED METHOD OF PHOTOTHERAPY. (Eng.) Ebbesen, F.; Moller, J. (Dept. Neonatology, Rigshospitalet, Univ. Copenhagen, Denmark). *Arch. Dis. Child.* 51(6):476-478; 1976.

5931 RELATIONSHIP OF HEPATIC BILIRUBIN EXCRETION TO FASTING AND FEEDING IN MAN [Abstract]. (Eng.) Lyon, D. T.; Ashkin, J. R.; Wagner, C. I.; Trotman, B. W.; Soloway, R. D. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA). *Clin. Res.* 24(3):288A; 1976.

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Nonviral Hepatitis and Hepatic Injury

5932 AZATHIOPRINE-INDUCED INTRAHEPATIC CHOLESTASIS. (Ger.) Iselin, H.; Knoblauch, M.; Binswanger, U.; Spycher, M.; Ruttner, J.; Staubli, M.; Lammli, J.; Frey, P. (Departement fur Innere Medizin, Universitat Zurich, Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 106(9):320-321; 1976.

Azathioprine-induced cholestasis was observed in 4 of 300 renal transplant patients. It was manifested by slowly developing, nonpainful icterus, without substantial impairment of the general condition and without systemic hypersensitivity reactions. All patients were receiving prednisone (10 mg/day) in addition to azathioprine. In some cases, maximum elevations of alkaline phosphatase, cholestatic enzymes, LAP, and 5-nucleosidase values were not reached until several weeks after azathioprine was stopped. Hepatitis B antigen was negative on repeated tests in all four patients, and there were no antibodies against DNA, cell nuclei, or smooth musculature. Antimitochondrial antibodies were present in one case. The histological picture was highly variable. Acute transplant rejection did not occur. The time interval between transplant and occurrence of cholestasis was not correlated with the total quantity of azathioprine administered nor with its average dose. Other possible causes of liver damage were eliminated, except in one patient who had had hepatitis 1 yr earlier. Hyperbilirubinemia disappeared completely within a few weeks after replacement of azathioprine by cyclophosphamide. Normalization of transaminases and cholestatic enzymes took several months in some of the cases.

5933 THE USE OF (+)-CATECHIN IN THE THERAPY OF HEPATIC DYSFUNCTION IN THE COURSE OF ANTITUBERCULAR THERAPY. PRELIMINARY RESULTS.

(Eng.) Grassi, C.; Casali, L. *In: New Trends in the Therapy of Liver Diseases. Proceedings of the International Symposium on New Trends in the Therapy of Liver Diseases, Tirrenia, June 6-7, 1974.* (Basel: Karger): pp. 191-198; 1975.

The use of (+)-catechin for the treatment of hepatic dysfunction was studied in 10 tuberculous men undergoing antituberculous treatment. (+)-Catechin was given at a total daily dosage of 1,500 mg, divided into three doses before meals for 30 days. Best results were obtained in patients in whom a fatty degeneration of hepatocytes was present. A clear tendency to normalization was noted in patients with dyspepsia. Transaminase values improved, but the 4-week study was too short for them to reach normal levels. In seven patients, bilirubin and alkaline phosphatase normalized. BSP retention values were excellent in four patients, and a notable improvement was seen in two others. In the three patients affected by cirrhosis, BSP retention studies showed unsatisfactory results. A certain degree of improvement in liver function tests can be achieved by (+)-catechin treatment. Clinically, an objective improvement was noted in most patients, particularly a clear-cut regression of the dyspeptic syndrome (8 of 10), an increased appetite (10 of 10), and a decreased jaundice (4 of 6; 4 patients has no jaundice). No side effects of the treatment were noted.

5934 HEPATOTOXIC HAZARD OF RIFAMYCIN.

(Fre.) Emerit, J. (Hopital de la Salpetriere, 47, bd de l'Hopital, 75634 Paris Cedex 13, France). *Entretiens Bichat. Ther.* 1975:140-142.

The hepatotoxic effect of rifamycin is enhanced by its combination with another substance metabolized by the liver, such as isoniazid. These drugs are involved in enzymatic competitive binding, adaptation, or inhibition processes; this can lead to an accumulation of the drugs' metabolites or radicals and to hepatic necrosis. The risk of hepatic toxicity will be greater when several drugs such as anticoagulants, phenylbutazone, sulfamides, and hypoglycemic agents are administered concomitantly. It will also be increased by the presence of a hepatic lesion or a deficient nutritional state.

5935 A CASE OF HEPATIC MUCORMYCOSIS.

(Fre.) Chailly, P.; Couturier, E. (Hopital Universitaire St.-Pierre, Bruxelles, Belgium). *Brux. Med.* 55(6):327-330; 1975.

A rare case of mucormycoses with liver involvement is reported in a 31-yr-old man. Initially hospitalized for an aplastic anemia attributed to a drug reaction, the patient was treated with blood transfusions and 500 mg/week of testosterone. He was hospitalized again for bronchopneumonia with pleural effusion. Blood and pleural fluid remained negative for pathogens; however, when the patient was treated with lincomycin and gentiamycin the signs of pneumonia regressed. Shortly thereafter, the clinical picture suggested a subphrenic abscess. The liver was enlarged and tender, and angiography suggested two intrahepatic abscesses. Surgical intervention revealed hepatic necrosis. Culture of the necrotic tissue was negative. The patient developed symptoms of hepatic insufficiency and died. The diagnosis of disseminated mucormycoses was made after histological examination of organs removed at autopsy. The fungal infection involved the lung, liver, spleen, and was the cause of a subhepatic thrombosis.

5936 FULMINANT HEPATITIS DUE TO THE "GLUE THISTLE" (Atractylis gummifera L): AN ANATOMIC-PATHOLOGIC STUDY OF FOUR CASES.

(Fre.) Lemaigre, G.; Tebbi, Z.; Galinsky, R.; Michowitcz, S.; Abelanet, R. (Service central d'Anatomie pathologique, C.H.U. Ben Badis, Constantine, Algeria). *Nouv. Presse Med.* 4(40):2865-2868; 1975.

Ten cases (children) of fulminant hepatitis with major hepatocytic necrosis due to the consumption of *Atractylis gummifera L* are reported. Four patients died at home. Of the six hospitalized children, only two survived. Autopsies of four children revealed extensive necrosis of the hepatic parenchyma, and congested centrilobular veins with edemous parietal thickening and endothelial necrosis. The mucosa of the small intestine displayed notable capillary congestion, and the renal parenchyma displayed tubulonephritic lesions of toxic origin. Clinical symptoms, which appeared within 24 hr of consumption, consisted of headache, epigastric pain, vomiting, rapidly followed by deep coma, major neurovegetative disorders (tachycardia, hypothermia), and sometimes digestive hemorrhage. The main toxic agent, potassium atractylate, competes with ADP by preventing its transformation into ATP in the mitochondria, and inhibits glycogen synthesis and oxidative phosphorylation.

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5937 INTRAHEPATIC CHOLESTASIS AFTER GRISEOFULVIN ADMINISTRATION. (Eng.) Chiprut, R. O.; Viteri, A.; Jamroz, C.; Dyck, W. P. (Scott and White Memorial Hosp., Temple, TX 76501). *Gastroenterology* 70(6):1141-1143; 1976.

5938 DRUG METABOLISM IN THE PRODUCTION OF LIVER INJURY. (Eng.) Mitchell, J. R.; Potter, W. Z. (Natl. Heart Lung Inst., Bethesda, MD 20014). *Med. Clin. North Am.* 59(4):877-885; 1975.

5940 CHOLESTATIC JAUNDICE POSSIBLY DUE TO BENZODIAZEPINE-TYPE DRUGS: CASE REPORT. (Eng.) Franks, E.; Jacobs, W. H. (Menorah Medical Center, Kansas City, KS). *Mo. Med.* 72(10): 605-607; 1975.

5939 LIVER ACTINOMYCOSIS: A CASE REPORT. (Eng.) Golematis, B.; Hatzitheofilou, C.; Melissas, J. (Medical Sch., Univ. Athens, Solonos 40, Athens 135, Greece). *Am. J. Gastroenterol.* 65(2):148-151; 1976.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

5941 THE PREVENTION OF HEPATITIS A USING POLYVALENT IMMUNOGLOBULINS. (Fre.) Celers, J.; De Romeuf, J.; Breart, G.; Bingino, C.; Dethan, M. (Sous-Direction de l'Hygiene Publique, 20 bis rue d'Estrees, F 75007 Paris, France). *Nouv. Presse Med.* 5(3):129-132; 1976.

The effectiveness of polyvalent immunoglobulins (Ig) for the treatment of hepatitis A was determined in a longitudinal study of a residential center for children with primary tuberculosis. Fifty children (under 10 yr of age) and 17 young adults (17- to 20-yr old), exposed to endemic hepatitis A, received Ig every 3 months for 1-17 months. Polyvalent Ig from human plasma was injected at doses of 0.1-0.2 ml/kg for children and 10 ml/kg for young adults (in a 16.5% solution). Sixty children and 30 young adults served as controls. SGPT levels increased in 6 of 30 control adults with icteric viral hepatitis but in none of those treated adults. SGPT levels also increased in 16 of 50 treated children, and in 31 of 60 control children. Viral contamination preceded treatment in 5 of 16 treated children because biological symptoms appeared less than 20 days after hospital admission. The remaining 11 developed symptoms 20-339 days later, which suggests hospital contamination. Although not foolproof, Ig treatment will prevent hepatitis A in 80-90% of cases when administered less than 14 days after contamination or before contamination.

5942 NONHUMAN PRIMATE-ASSOCIATED VIRAL HEPATITIS TYPE A: SEROLOGIC EVIDENCE OF HEPATITIS A VIRUS INFECTION. (Eng.) Dienstag, J. L.; Davenport, F. M.; McCollum, R. W.; Hennessy, A. V.; Klatskin, G.; Purcell, R. H. (Natl. Inst. Allergy Infectious Diseases, Natl. Inst. Health, Bldg. 7, Room 301, Bethesda, MD 20014). *JAMA* 236(5):462-464; 1976.

Paired serum samples from two hepatitis outbreaks were tested for antibody to hepatitis A antigen (anti-HA) by immune adherence hemagglutination (IAHA) to determine whether two previously reported cases of nonhuman primate-associated viral hepatitis (NPAH) were caused by human viral hepatitis type A. In 1964, five cases of NPAH were identified among contacts of a recently imported chimpanzee in Wayne County, MI. Among three individuals tested, serological evidence showed acute infection with hepatitis A virus. Sera were negative for the hepatitis B surface antigen (HBsAg), and no serological response was found to either of the two antigens associated with hepatitis B virus. In 1970, eight cases of NPAH were identified among contacts of a chimpanzee in Bridgeport, CT. A liver biopsy of the chimpanzee showed morphological changes consistent with mild, resolving acute hepatitis. A woolly monkey gave chemical and histological evidence of acute hepatitis at the same time. The woolly monkey did not have contact with the chimpanzee, but was handled by the same animal handlers. In a cage mate of the chimpanzee, acute infection was documented serologically by high titer antibody development, despite the absence of clinical signs of disease. One handler had a serologic response consistent with acute infection. Both the woolly monkey and its cage mate (which had an inapparent infection) seroconverted, and anti-HA developed. All affected animals and humans were free of serum HBsAg, and no rising titers of serum anti-HBs or antibody to the hepatitis B core antigen developed in these cases. This is the first demonstration of susceptibility to hepatitis A virus infection in woolly monkeys. This study confirms retrospectively by serologic means an association between hepatitis A virus and NPAH in two outbreaks, widely separated by time and place.

5943 (+)-CYANIDANOL-3 TREATMENT IN ACUTE VIRAL HEPATITIS. (Eng.) Seyfried, H.; Brunner, H.; Grabner, G. *In: New Trends in the Therapy of Liver Diseases. Proceedings of the International Symposium on New Trends in the Therapy of Liver Diseases, Tirrenia, June 6-7, 1974.* (Basel: Karger): pp. 177-181; 1975.

The clinical effects of (+)-cyanidanol-3 were studied in 35 patients with acute viral hepatitis. Eighteen patients received 0.5 g of (+)-cyanidanol-3 three times daily, and 17 patients received a placebo. There were no significant differences between the two groups with respect to age; sex ratio; time elapsed between the initial symptoms and hospitalization; initial values for total serum bilirubin, SGOT, and SGPT; and the duration of hospitalization. Since the patients were hospitalized at different stages of their illness, an attempt was made to adjust all cases to the same stage of disease by using peak bilirubin and transaminase levels as point of comparison. The time it took for serum bilirubin levels to fall from 10 mg% to 2 mg%, and for transaminase levels to fall from their initial elevated values to 100 mU/ml was calculated. The serum bilirubin fell more rapidly in the patients receiving therapy than in the controls; in treated patients, the level fell from 10 to 2 mg% on an average of 5 days earlier than in controls. Similarly, a more rapid decline in transaminase levels was seen in treated patients; the mean number of days required for SGOT and SGPT levels to fall to 100 mU/ml was 5.3 and 9.1, resp., in the treated patients, and 10.2 and 13.1 days, resp., in the controls. The results show that (+)-cyanidanol-3 treatment does not influence the length of hospitalization nor the period from admission to the final disappearance of hyperbilirubinemia. When the results are adjusted to the same stage of disease, it appears that (+)-cyanidanol-3 treatment may be effective during the healing phase of uncomplicated acute viral hepatitis by accelerating the decrease of biochemical substances that are considered to be signs of cellular damage.

5944 HEMATOLOGIC MANIFESTATIONS OF COMMON ACUTE VIRAL HEPATITIS. (Fre.) Chivrac, D.; Capron, J.-P.; Lorriaux, A. (Centre Hospitalier Universitaire, place Victor-Pauchet, F 80030 Amiens Cedex, France). *Arch. Fr. Mal. App. Dig.* 65(3): 239-248; 1976.

A literature review is presented of hematologic changes observed in the course of acute viral hepatitis. Erythrocytic alterations consist of higher hemoglobin and hematocrit values at the start of icterus than at the end (within normal limits); this variation may be caused either by an initial erythrocytosis or a late anemia. The most frequent leukocytic anomaly is early leukopenia; less frequent are a relative or absolute lymphocytosis, hypereosinophilia, and hyperleukocytosis. Leukopenia is due to a transitory medullary insufficiency, perhaps related to the multiplication of the virus in the hematopoietic organs. Blood platelet count is hardly modified. Posthepatic medullary aplasia occurs rarely, but is irreversible and usually fatal (mortality, 85.1-88%). There is an average of 9.3 weeks between the beginning of the hepatitis and the onset of the aplasia. The causal mechanism may be related to hepatocellular insufficiency, an autoimmune mechanism of viral origin or, most likely, the medullary toxicity of the virus. Hypersensitivity of some individuals and toxic drug reactions have also been implicated in the development of medullary aplasia.

5945 THE NUCLEAR DRY WEIGHT OF LIVER CELLS FROM PATIENTS WITH VIRUS HEPATITIS AND FROM CONTROLS. (Eng.) Ranek, L. (Div. Hepatology Rigshospitalet, Copenhagen 0, Denmark). *Acta Cytol. (Baltimore)* 20(1):58-61; 1976.

Experiments were carried out in hepatic biopsy material from 11 patients with viral hepatitis and from 7 patients with normal livers, to determine whether increased nuclear dry weight of liver cells is responsible for the higher nuclear volume seen in patients with viral hepatitis. The nuclear dry weights were determined by microinterferometry. The average nuclear dry weight of diploid nuclei was significantly greater in patients with hepatitis (45.4 pg) than in controls (39.9 pg). The average nuclear volume of diploid nuclei was 241 μ^3 in controls and 274 μ^3 in the hepatitis patients, which was not statistically significant. The average volume of tetraploid nuclei was 492 in controls and 525 in hepatitis patients. The average dry mass concentration was not significantly different, neither between controls and hepatitis nuclei nor between di- and tetraploid nuclei. The correlation coefficients between dry weight and volume of diploid nuclei were significantly positive in all but one of the hepatitis cases; in it, the correlation was 0.381. The results show that during viral hepatitis the nuclear dry weight and volume increase. It appears that the increased nuclear dry weight of liver cells is responsible for the higher nuclear volume seen in patients with viral hepatitis.

5946 PECULIAR ASPECTS ("VIROPLASMS") OF VIRAL TYPE PARTICLES WITHIN THE HEPATOCYTES IN HEPATITIS WITH AUSTRALIA ANTIGEN. (Fre.) Leung, T. K.; Feroldi, J.; Bertrand; Bonnamour, C.; Brette, R. (Laboratoire d'Anatomie pathologique, Universite Claude Bernard, 8, avenue Rockefeller, 69373 Lyon Cedex 2, France). *Ann. Anat. Pathol.* 20(3): 293-302; 1975.

Intrahepatocytic particles were observed ultrastructurally in liver biopsies of 32/45 patients with hepatitis positive for the Australia antigen. Contrary to the usual viral particles associated with the Australia antigen, these particles were dense, granulofilamentous agglomerates, dispersed in the nucleus, sometimes in the immediate vicinity of the nucleoli and nuclear bodies. Within the agglomerates, complete or partial rounded particles were observed, the morphology of which was reminiscent of the usual intranuclear particles. In view of the accepted chronology of viral replication, these agglomerates can be referred to as "viroplasms" and are representative of an intermediate stage in the formation of nuclear particles. The data support the hypothesis that nuclear replication of the particles is associated with the Australia antigen.

5947 LOCALIZATION OF HEPATITIS B SURFACE ANTIGEN IN CONVENTIONAL PARAFFIN SECTIONS OF THE LIVER. COMPARISON OF IMMUNOFLUORESCENCE, IMMUNOPEROXIDASE, AND ORCEIN STAINING METHODS WITH REGARD TO THEIR SPECIFICITY AND RELIABILITY AS ANTIGEN MARKER. (Eng.) Nayak, N. C.; Sachdeva, R. (All-India Inst. Medical Sciences, Ansari Nagar, New Delhi-110016, India). *Am. J. Pathol.* 81(3):479-492; 1975.

Immunofluorescence, immunoperoxidase, and orcein staining methods were compared for their specificity and reliability as a marker for hepatitis B antigen (HBAg). Six consecutive sections were cut from paraffin blocks of formalin-fixed liver tissue collected at autopsy from 43 subjects with various liver diseases. Slide 1 was stained by hematoxylin and eosin, and the remaining slides were stained for HBAg by various procedures. Antigen was observed in the livers from several patients with cirrhosis and primary liver cancer, but in none of the other livers, including one from a patient with acute fulminant hepatitis. Whenever a HBAg-positive liver was identified, localization could generally be uniformly seen by all staining techniques. Immunoperoxidase staining by either the double or single sandwich technique presented a much more convincing localization of the antigen than immunofluorescence or orcein; assessment was much easier than in the immunofluorescent preparation, and comparison with the orcein-stained material was considerably simpler. Localization in orcein-stained preparations, both within individual cells and in geographic areas of the tissue section, matched extremely well with that seen in the immunofluorescence and immunoperoxidase preparations. The morphology and structure of HBAg was most evident in the orcein-stained preparations, and to a large extent in the immunoperoxidase preparations. In the orcein stain, the amber staining of the antigen stood out prominently against the beige cytoplasmic background, and the hematoxylin staining of the nucleus. The results demonstrate that HBAg can be clearly localized in the liver cells of formalin-fixed, paraffin-embedded material. Localization can be successfully achieved, not only by empirical orcein staining, but also by the specific immunostaining methods using fluorescence and peroxidase.

5948 GENOME OF HEPATITIS B VIRUS: RESTRICTION ENZYME CLEAVAGE AND STRUCTURE OF DNA EXTRACTED FROM DANE PARTICLES. (Eng.) Summers, J.; O'Connell, A.; Millman, I. (Inst. Cancer Res., Fox Chase Cancer Center, Philadelphia, PA 19111). *Proc. Natl. Acad. Sci. USA.* 72(11):4597-4601; 1975.

The structure of unreacted DNA from Dane particles was characterized by specific cleavage with a restriction enzyme from *Hemophilus aegyptius* (R-HaeIII) and by gel electrophoresis. *In vitro* replicated DNA from Dane particles was resolved into two components by polyacrylamide gel electrophoresis: the major component migrated at a position of linear DNA of 3,600 nucleotide pairs; the other was heterogeneous in size, and migrated at positions ranging from less than 1,500 to approximately 3,600 nucleotide pairs. *In vitro* replication of undenatured DNA using avian myeloblastosis virus DNA polymerase and [α-^{32}P]dATP indicated the presence of substantial single-stranded regions in the molecule. The native DNA migrating through the gel separated into two components typical of the behavior of linear and circular double-stranded DNA of the same molecular weight. The faster form migrated like double-stranded linear DNA 3,600 nucleotides in length; the slower form appeared to be a circular form 3,600 nucleotides in length. Both forms migrated more rapidly if they were obtained early in the reaction, indicating that single-stranded regions were being repaired. The radioactive product at the end of the reaction was approximately 3,600 nucleotides in length, but at earlier times, radioactivity appeared in molecules less than 3,600 nucleotides in length, indicating that elongation of shorter strands occurred during the course of the reaction. It is concluded that the Dane particle DNA is a double-stranded circular DNA approximately 3,600 nucleotides in length, containing a single-stranded gap of 600-2,100 nucleotides. Although the Dane particle DNA may code for the virion DNA polymerase, the specificity of the reaction appears to reside in the template DNA and not in the DNA polymerase.

5949 DISTRIBUTION PATTERN OF ISOENZYMES OF ALKALINE PHOSPHATASE IN PATIENTS WITH VARIOUS FORMS OF HEPATITIS. (Ger.) Ohlen, J.; Richter, J. (II. Medizinische Klinik und Poliklinik der TU, Ismaninger Strasse 22, D-8000 Munich 80, W. Germany). *Med. Klin.* 71(7):292-299; 1976.

The hypothesis that the elevated alkaline phosphatase (AP) levels in various types of hepatitis correspond to different isoenzyme compositions, depending on whether the AP accumulation is due to uniformly impaired degradation of the intestinal, osseous, and hepatobiliary components or to a combination of this with hepatobiliary reflux, was examined. Measurements were made weekly for 2-3 months in 40 patients with uncomplicated acute hepatitis, 12 patients with cholestatic hepatitis, and 10 patients with histologically confirmed chronic persistent hepatitis. The isoenzyme distribution pattern in acute hepatitis corresponded qualitatively to that of the control group throughout the course of the disease. The fraction of intestinal AP remained close to the control value of 20%. The Q-value, reflecting the ratio of hepatobiliary to osseous enzyme, also remained close to the control value of 17. In cholestatic hepatitis, the share of AP declined to about 13% at 3-6 weeks, then increased to 18% by 8 weeks. The Q-value rose to 31 during the first week, then declined as the illness resolved, reaching 21 by 8 weeks. In the patients with chronic persistent hepatitis, the percentage of intestinal AP remained slightly, but significantly, elevated throughout 12 weeks of observation, while the Q-value varied only slightly. The hypothesis that the correspondance of the AP elevation to isoenzyme composition depends on the impaired degradation of the intestinal, osseous, and hepatobiliary components and to hepatobiliary reflux was confirmed.

5950 ISOENZYMATIC SPECTRUM OF LACTATE DEHYDROGENASE, MALATE DEHYDROGENASE, ALDOLASE AND ASPARTATE AMINOTRANSFERASE IN INFECTIOUS HEPATITIS (BOTKIN'S DISEASE).

(Rus.) Tkemaladze, L. M.; Pirtskhalava, M. B. (Inst. Experimental Clinical Therapy, Ministry Public Health, Georgia, USSR). *Ter. Arkh.* 46(4):59-62; 1974.

The isoenzymatic spectrum of lactate dehydrogenase (LDH), malate dehydrogenase (MDH), aldolase, and aspartate aminotransferase in infectious hepatitis and its dynamics were studied using the enzymograms of 60 patients. Isoenzymes were determined by disc electrophoresis in polyacrylamide gels. Considerable shifts in isoenzymes were seen in the spectra of LDH, MDH, aldolase, and aspartate aminotransferase. The content of the cathode fractions increased, but that of the anode fractions decreased. In the spectrum of LDH, the content of LDH-4 increased, and that of LDH-5 was sharply increased. Among the isoenzymes of MDH, the sharp increase in MDH-3 was still less than that of MDH-5. The content of aldolase-4 and aldolase-5 was increased, as was the activity of mitochondrial aspartate aminotransferase. Despite the reduction of total activity in these enzymes over the patients' hospitalization, no normalization of enzymograms was observed.

5951 STUDIES OF THE "e" ANTIGEN IN ACUTE AND CHRONIC HEPATITIS.

(Eng.) Smith, J. L.; Murphy, B. L.; Auslander, M. O.; Maynard, J. E.; Schalm, S. S.; Summerskill, W. H. J.; Gitnick, G. L. (Center Disease Control, Phoenix, AZ). *Gastroenterology* 71(2):208-209; 1976.

The sera of 32 healthy hepatitis B surface antigen (HBsAg)-negative patients, 24 healthy HBsAg carriers, 76 patients with post-transfusion hepatitis, and 50 patients with chronic active liver disease (CALD) were tested for the presence of e antigen and e antibody by rheophoresis, to assess the clinical significance of these serological markers in acute and chronic hepatitis. Among the 50 patients with CALD, 18 had a serologically documented, antecedent hepatitis B infection, and the remaining cases were serologically proven to be unrelated to hepatitis B. The e antigen or antibody was found only in patients with serological evidence of past or current hepatitis B virus infection. Whereas e antibody was found both in patients with HBsAg and with antibody to HBsAg (anti-HBs), e antigen was detected only in sera positive for HBsAg. The antigen was found in 8 of 15 HBsAg-positive CALD patients, compared with 2 of 24 asymptomatic HBsAg carriers. E antibody was found in 15 of 24 asymptomatic HBsAg carriers, in comparison with only 3 of 18 CALD patients with antecedent hepatitis B infection. Of the three anti-e-positive CALD patients, two were anti-HBs-positive and one was HBsAg-positive. The two patients whose acute phase sera contained e antigen were not the same as two patients whose convalescent phase sera contained e antibodies. The data confirm the specific association between the e determinant and hepatitis B infections, and indicate that e antigen is closely associated with evidence of chronic hepatic dysfunction, in contrast to the association of e antibody with hepatic normalcy in HBsAg carriers. These correlations are not absolute, and it should not be inferred that all e antigen-positive individuals will develop chronic hepatitis or that the presence of e antibody invariably protects against the development of chronic hepatitis.

5952 TRANSMISSION OF HEPATITIS TYPE B FROM HEALTHY HBsAg-POSITIVE MOTHERS.

(Eng.) Skinhoj, P.; Cohn, J.; Bradburne, A. F. (Bispebjerg Hosp., DK-2400 Copenhagen NV, Denmark). *Br. Med. J.* 1(6000):10-11; 1976.

Sera from 17 mothers, all apparently healthy carriers of hepatitis B surface antigen (HBsAg), were tested for HBsAg, the HBsAg antibody (anti-HBs), hepatitis B core antigen (HBcAg), and heaptitis B-associated e antigen (HBeAg) for 4-5 yr. The transmission rate of hepatitis B virus (HBV) infection to the children during pregnancy was determined. The subjects included 16 index children who showed no evidence of transmission 1 yr after birth, 16 mothers, 13 additional siblings (aged 18 months-8 yr), and 5 husbands. The 17th index mother had had a renal graft; she, her 3-yr-old child, and her husband were also included. At the follow-up examination, all mothers were asymptomatic and had circulating antibodies to HBcAg. HBeAg was found only in the renal transplant recipient, while the other 16 mothers had antibodies to the e determinant. All children of these 16 mothers had normal liver function and remained negative for HBsAg and anti-HBs. Anti-HBc was found in three children from different families. None of the fathers showed evidence of infection. The child of the HBeAg-positive mother was positive for HBsAg, HBeAg, and anti-HBc and had a slightly raised alanine aminotransferase level. The father had no history or evidence of infection, but he was positive for anti-HBs, and his alanine aminotransferase level was elevated. A second child, born near the end of the study period, became positive for HBsAg despite prophylactic hyperimmune γ-globulin treatment at birth. This study confirms that the healthy HBsAg carriers, although positive for anti-HBc, did not infect their children during the 4-5 yr study. In contrast, hepatitis was transmitted to the children and husband of the HBeAg-positive mother.

5953 HEPATITIS B IN AUSTRALIAN ABORIGINES AND TORRES STRAIT ISLANDERS: GEOGRAPHICAL, AGE, AND FAMILIAL DISTRIBUTION OF ANTIGEN SUBTYPES AND ANTIBODY. (Eng.) Barrett, E. J. (Queensland Inst. Medical Res., Herston Rd., Valley, Queensland 4006, Brisbane, Australia). *Aust. N.Z. J. Med.* 6(2):106-111; 1976.

The high rate of hepatitis B antigenemia was studied in Australian aborigines, using serum samples from the Northern Territory and Queensland. Immunodiffusion showed that populations from 16 centers in the Northern Territory had an overall incidence of 8.5%, in contrast to 2.7% in Queensland. Subtype *ay* predominated in both areas. The *d* antigen was not found in these areas, and only subtype *ad* was found in Torres Strait Island adults. Both the *d* and *ad* subtypes were found in Brisbane hepatitis patients and blood donors. In the Northern Territories, reactors were more frequent among males ($0.025<p<0.01$) and in younger age groups ($p<0.001$). In Queensland, reactors were more frequent among males, but less frequent in persons under 30 yr ($0.05<p<0.025$). Four of 213 sera tested were negative by immunodiffusion, but positive by complement fixation, although only at a titer of 1 in 8. Forty-nine of the 213 were anticomplementary; an additional reactor was found among 133 aboriginal children (0.8%). A higher proportion of additional reactors occurred among three adult groups: 6 of 39 Australian aborigines from Kowanyama, 1 of 10 from Aurukun, and 9 of 40 from Torres Strait gave reactions which could be inhibited specifically by antiserum. Antibody reacting by passive hemagglutination to reciprocal titers of 16 or more was prevalent in Australian aborigines (46/662, 6.9%) and Torres Strait Islanders (6/58, 10.3%) but was uncommon in Caucasians (1/234, 0.4%). Antibody prevalence increased with age in aborigines, and positive reactors were distributed throughout the population with less evidence of clustering. It is concluded that the high prevalence of hepatitis B antigen and antibody in these populations indicates a much higher incidence of infection than has been found in urban Caucasian populations.

5954 HEPATITIS B IN RETREAT FROM DIALYSIS UNITS IN UNITED KINGDOM IN 1973. PUBLIC HEALTH LABORATORY SERVICE SURVEY. (Eng.) Polakoff, S.; *et al.* (Central Public Health Lab., London NW9 5HT, England). *Br. Med. J.* 1(6025):1579-1581; 1976.

A survey of the incidence of hepatitis in hemodialysis units that began in 1968 was combined in January 1970 with a hepatitis B prevention program; the results obtained from 33 of the 48 hemodialysis and transplant units in the United Kingdom in 1973 are presented. The hepatitis B prevention program is based on regular tests for hepatitis B surface antigen (HBsAg) of sera from patients and staff before entry to the units and at regular intervals afterwards. Since the institution of this program, there had been a sustained decline in the incidence of hepatitis B, to the low level of 0.3% among patients and 0.1% among staff members in 1973. The infection developed in only three patients, who were all in one unit in which a hepatitis B outbreak had been in progress since 1970. Two staff members in the same unit developed the disease. The incidence of other types of hepatitis among patients was higher in 1973 than in the previous peak year, 1970. Of the 1,913 patients being maintained in the 33 units, 33 were HBsAg carriers in 1973, and a further 8 patients (not tested in 1973) had been persistent carriers previously; if these eight are assumed to have continued HBsAg carriage, the prevalence of HBsAg among all patients in 1973 was 2.1 per 100. Comparisons with data from other countries suggest that the almost complete elimination of hepatitis B from dialysis units in the U.K. was due to the prevention program.

5955 OYSTER-ASSOCIATED HEPATITIS: LESSONS FROM THE LOUISIANA EXPERIENCE. (Eng.) Mackowiak, P. A.; Caraway, C. T.; Portnoy, B. L. (Dallas Veterans Admin. Hosp., 4500 S. Lancaster Rd., Dallas, TX 75216). *Am. J. Epidemiol.* 103(2):181-191; 1976.

An outbreak of oyster-associated hepatitis, which occurred in Louisiana during October and November of 1973, is related to two similar outbreaks, which occurred simultaneously in Houston, Texas and Calhoun, Georgia. All of the infected persons had consumed raw oysters: 263 had eaten them in one of 10 Houston restaurants; 15 of 225 persons attending one of two dinners in Calhoun were infected; and 37 persons from Louisiana were infected. Contamination of the oysters probably occurred before harvesting, and probably during Mississippi River flooding the previous spring. The oysters concentrated the virus in their tissue, to a level in excess of that which existed in the surrounding waters. They retained the virus for 1-2 months after the flood receeded. Because these waters were closed after the flooding, no oysters reached consumers until the last week of August. Given the 1-month incubation period for hepatitis A, it is not surprising that cases of hepatitis were not noted until early October.

5956 THE HEPATITIS B ANTIGEN IN CHRONIC GLOMERULONEPHRITIS. (Fre.) Guardia, J.; Pedreira, J. D.; Martinez-Vazquez, J. M.; Vidal, M. T.; Vilardell, M.; Caralps, A.; Ferrer, E.; Bacardi, R. (Departements de Medecine Interne et Pathologie, Cite Sanitaire de la Securite Sociale, Universidad Autonoma, Barcelona 16, Spain). *Nouv. Presse Med.* 4(41):2923-2925; 1975.

The association of glomerulonephritis with the hepatitis B antigen (HBAg) and chronic hepatitis was studied in 11 cases of chronic glomerulonephritis (5 membranous forms, 3 mesangial, 2 membranoproliferative, and 1 endo- and extracapillary with hyaline thrombus). Serum was positive for HBAg in eight cases and anti-HBAg was present in one case. In the first group, six patients had subtype *ad* and two, subtype *ay*. Three relatives from two families were also HBAg-positive, with the same subtype as the patient. Hepatic biopsy of six patients revealed three with active chronic hepatitis, two with persistant chronic hepatitis, and one patient without hepatitis (patient with anti-HBAg). The data suggest that serum positive for HBAg in cases of chronic glomerulonephritis, especially membranous glomerulonephritis, is frequently associated with a clinically latent chronic hepatitis.

5957 VIRAL HEPATITIS AND BONE MARROW APLASIA. (Fre.) Claude, R.; Michel, J. P.; Laubie, B.; Hirtz, J.; Pillegand, B. (Hopital General, 87 Limoges, France). *Med. Chir. Dig.* 4(3):149-154; 1975.

A case report is presented of a 37-yr-old man who developed posthepatic medullary aplasia 40 days after the onset of a cytolytic jaundice. The hemogram and myelogram revealed a triple hematopoietic deficiency (2% RBC, 11% granulocytes, and 87% mononucleated cells). Despite polyvitamin and corticosteroid (30 mg delta cortisone, 60 mg oxymethalone, p.o.) treatment, hemorrhaging symptoms worsened (epistaxis, melena, and hematuria), leading to death 8 months after the onset of the hepatitis. Present pathogenic hypotheses from the literature suggest a viral or autoimmune link between medullary aplasia and viral hepatitis.

5958 PRESENT STATE OF THE EPIDEMIOLOGIC RESEARCH ON THE AUSTRALIA ANTIGEN IN SENEGAL. (Fre.) Diebolt, G.; Baylet, R.; Linhard, J. (Faculte de Medecine de Dakar, 34000 Montpellier, France). *Pathol. Biol. (Paris)* 23(6):429-432; 1975.

5959 CURRENT STATUS OF THE TREATMENT OF ACUTE HEPATIC ATROPHIES OF VIRAL ETIOLOGY. (Fre.) Opolon, P. (Secteur de soins intensifs, C.H.U. Saint-Antoine, 75012 Paris, France). *Rev. Med. (Paris)* 17(6):307-312; 1976.

5960 AUSTRALIA ANTIGENEMIA (HEPATITIS B-ANTIGENEMIA) IN VIRAL HEPATITIS IN PREGNANT WOMEN. (Pol.) Boroń, P.; Bobrowska, E.; Grabianska, A.; Karwowska, K. (Klinika Chorob Zakaznych Akademii Medycznej 15-540 Bialystok, ul. Zurawia 14, Poland). *Przegl. Epidemiol.* 29(2):153-157; 1975.

5961 BLOOD PERFUSION THERAPY FOR ACUTE HEPATIC FAILURE. (Ger.) Blume, U.; Helmstaedt, D.; Sybrecht, G.; Baldamus, C.; Sussmann, P.; Heyer, U.; Schmidt, E.; Schmidt, F. W. (Department Innere Medizin, Medizinische Hochschule, 3000 Hannover-Kleefeld, Karl-Wiechert-Allee 9, W. Germany). *Dtsch. Med. Wochenschr.* 101(14):559; 1976.

5962 TREATMENT OF COMA DUE TO LIVER CELL NECROSIS BY EXTRACORPOREAL BLOOD PERFUSION WITH HUMAN AND BABOON LIVER AND WITH ACTIVATED CARBON. (Ger.) Lie, T. S.; Gutgemann, A. (No affiliation given). *Z. Gastroenterol.* 14:264-265; 1976.

5963 CHRONIC HEPATOPATHIES AND AUSTRALIA ANTIGEN. LONG-TERM PROSPECTIVE STUDY. (Fre.) Waes, L. van; Segers, J.; Edmond, J. van; Vanimmen, L.; Barbier, F.; Wieme, R.; Demeulenaere, L. (No affiliation given). *Rev. Fr. Gastroenterol.* (115):2239-2240; 1976.

5964 LYSOSOMAL ENZYMES OF PERIPHERAL BLOOD LYMPHOCYTES IN PATIENTS WITH VIRAL HEPATITIS. (Pol.) Lisiewicz, J.; Sowa, J. (Klinika Hematologiczna Akademii Medycznej, 31-501 Krakow, ul. Kopernika 17, Poland). *Przegl. Epidemiol.* 29(2):169-173; 1975.

5965 BEHAVIOR OF COBALT-ACTIVATED ACYLASE IN THE SERUM OF PATIENTS WITH VIRAL HEPATITIS. (Pol.) Tkaczewski, W.; Zaorska, T.; Matuszak, J.; Adamczewski, Z. (Klinika Chorob Zakaznych Wojskowej Akademii Medycznej, 91-347 Lodz, ul. Kniaziewicza 1/5, Poland). *Przegl. Epidemiol.* 29(2):175-178; 1975.

5966 SPONTANEOUS IMMUNE ADHERENCE IN THE COURSE OF VIRAL HEPATITIS. (Fre.) Daniel, Ph.; Baillet, J. (Laboratoire de Virologie, Faculte de Medecine d'Amiens, Place Victor-Pauchet, 80030 Amiens, France). *Biomedicine* 25(1):28-30; 1976.

5967 DYNAMICS OF THE SERUM LEVELS OF HBs ANTIGEN IN THE ACUTE PHASE OF TYPE B VIRAL HEPATITIS FOR THE PREDICTION OF THE COURSE OF THE DISEASE. (Pol.) Loch, T.; Poznanska, H. (Klinika Chorob Zakaznych Akademii Medycznej, 01-201 Warszawa, ul. Wolska 37, Poland). *Przegl. Epidemiol.* 29(2):179-183; 1975.

5968 DISTRIBUTION OF HBAg SUBTYPES IN ACUTE HEPATITIS B IN NORTHERN ITALY. (Ita.) Gerna, G.; Fiori, G. P.; Cattaneo, E.; Achilli, G.; Cereda, P. (Divisione Malattie Infettive, Ospedale Civile di Alessandria, Alessandria, Italy). *Minerva Med.* 67(23):1494-1499; 1976.

5969 CONDITIONS AFTER VIRAL HEPATITIS. MORPHOLOGICAL EVALUATION. (Cze.) Weisz, P.; Niederland, T. R.; Zacharova, M.; Cervenka, J.; Tomik, F. (P. W., 800 00 Bratislave, Februaroveho vitazstva 163). *Cesk. Gastroenterol. Vyz.* 29(5):297-301; 1975.

5970 STUDY OF AN HBsAg EPIDEMIC, SUBTYPE (ay), HEPATITIS. (Fre.) Pons, F.; Borda, F.; Perez-Miranda, M. (Service de gastroenterologie, Clinique universitaire de Navarre, Pamplona, Spain). *Acta Gastroenterol. Belg.* 39(5/6):203-211; 1976.

5971 FULMINANT HEPATITIS, ITS COMPLICATIONS AND POSSIBILITIES OF TREATMENT. (Ger.) Philippsen, H. (III. Med. Klinik der Fakultat, Klinische Medizin Mannheim der Univ. Heidelberg, 68 Mannheim 31, Marburger Strasse, W. Germany). *Fortschr. Med.* 93(27):1290-1294; 1975.

5972 FULMINANT ACUTE HEPATITIS TREATED BY IMMUNOLOGIC THERAPY. (Ita.) Pelosi, G.; Pelagatti, M.; Ghinelli, F.; Fiaccadori, F. (Divisione Malattie Infettive, Ospedale Regionale, 43100 Parma, Italy). *Ateneo Parmense* [*Acta Biomed.*] 47(1):15-22; 1976.

5973 CURRENT STATUS OF THE TREATMENT OF ACUTE HEPATIC ATROPHIES OF VIRAL ETIOLOGY. (Fre.) Opolon, P. (Secteur de soins intensifs, C.H.U. Saint-Antoine, 75012 Paris, France). *Rev. Med. (Paris)* 17(6):307-312; 1976.

See also, 5874, 5975, 5981, 5984, 6088.

LIVER AND BILIARY TRACT

Chronic Hepatitis

5974 IMMUNE COMPLEXES IN CHRONIC HEPATITIS. (Eng.) Fodor, O.; Parau, N.; Fodor, I.; Radu, D.; Abrudan, O. (IIIth Medical Clinique, Cluj, Rumania). *Acta Hepatogastroenterol.* 23(3): 172-176; 1976.

The incidence and possible role of immune complexes in chronic hepatitis were studied in chronic hepatitis patients and in controls. Rheumatoid factors were present in 33.2% of 274 patients with hepatitis, and in 2.8% of 380 controls. Cryoglobulins occurred in 47.6% of 144 patients tested and in 4.7% of 42 controls. Anticomplementary activity was present in 34.2% of 52 patients and in 2% of 50 controls. No statistically significant loss of total complement was observed, but its C1 and C3 components exhibited lowered titers in 48.6% and 45.7%, resp., of 160 patients with chronic active hepatitis. The presence of rheumatoid factors in chronic hepatitis may be due to prolonged, viral, or other antigen stimulation, which results in the formation of antigammaglobulins capable of reacting with immunoglobulin G (IgG) from complexes. It is also possible that antigen-antibody reactions may result in structural alteration of the antibody part of the complex, and stimulate the formation of a previously described serum factor called anti-antibody. These complexes may localize in any area of inflammation and induce subsequent damage; it is likely that hepatic lesions can be linked to a chain of events involving formation of an immunoglobulin complex with antiglobulin factors and complement fixation. Since immunoglobulins from complexes isolated as mixed IgG-IgM cryoglobulins behave both as anti-hepatitis B-antibody and as an anti-IgG rheumatoid factor, the IgM immunoglobulins must be produced in response to hepatitis B antigen and also to the hepatitis B antigen-hepatitis B antibody-complex.

5975 SERUM INHIBITORY FACTORS (SIF) IN PATIENTS WITH ACUTE AND CHRONIC HEPATITIS AND THEIR CLINICAL SIGNIFICANCE. (Eng.) Brattig, N.; Berg, P. A. (Dept. Medicine, Univ. Tubingen, D-7400 Tubingen, Auf dem Schnarrenberg, W. Germany). *Clin. Exp. Immunol.* 25(1):40-49; 1976.

Sera from 18 patients with hepatitis B surface antigen (HBsAg)-positive viral hepatitis, 9 patients with chronic persisting hepatitis (CPH), and 6 juvenile patients with developing chronic active hepatitis (CAH) were tested for serum inhibitory factors (SIF) to correlate inhibitory activity with clinical, biochemical, and histologic parameters. These factors were also studied in 15 patients with HBsAg-positive and -negative CAH. Lymphocytes from 6 controls, 9 patients with acute HBsAg-positive hepatitis, and 11 patients with CAH were stimulated with 2, 10, and 50 μg phytohemagglutinin (PHA). HBsAg and HBsAb were detected by radioimmunoassay, and antibodies against smooth muscle (SMA), nuclei (ANA), mitochondria (AMA), and vascular endothelium were detected by immunofluorescence. All sera markedly depressed the PHA-induced transformation of normal lymphocytes during the first week, showing a mean index of 0.25 ± 0.12 ($p<0.001$). The serum inhibitory effect disappeared gradually, and after 4 weeks, 67% of the patients' sera had lost these factors; 7 weeks after onset, none showed inhibition activity. In six patients, SIF was also demonstrated during the incubation period, up to 4 weeks before onset of jaundice, and in one case, before the appearance of HBsAg. In patients with CPH, SIF was at the lower limit of the normal range (mean 0.74 ± 0.10) in a 3-yr follow-up. Strong and lasting inhibitory activity was observed in six young patients (age 10-27 yr) with a progressive course of CAH, who were followed-up for 4 yr; CAH was clinically and histologically evident in all patients when reexamined 1-3 yr after the first symptoms. Clinical status and liver biopsies correlated well with the serum inhibitory activity in 12 patients. It is concluded that SIF is produced in response to viral infections and released from lymphocytes as long as viral antigenic stimulus persists.

5976 PENICILLAMINE IN THE TREATMENT OF CHRONIC ACTIVE LIVER DISEASE. (Eng.) Stern, R.; Williams, R. (King's Coll. Hosp. Medical Sch., Denmark Hill, London, S.E.5, England). *Med. Chir. Dig.* 4(3):141-144; 1975.

Clinical experience with penicillamine in the treatment of chronic active liver disease (CALD) is summarized, together with the observed side-effects and the pharmacological actions that may make it valuable in the treatment of this condition. The two actions of the most relevance to the effectiveness of penicillamine in CALD are its ability to dissociate immunoglobulin molecules and its inhibitory effect on collagen biosynthesis. The earliest report of the use of penicillamine described two patients with subacute hepatic necrosis, who were treated with 1.8 g/day; after 6 months, the liver function tests returned to normal in both patients, and in one, a repeat liver biopsy showed the absence of histological progression of the lesion. Similar results were obtained in the treatment of a patient with cholestatic hepatitis. Subsequently, at least six authors have reported favorable results with the drug in series of up to 34 patients. Unfortunately, none of these series was controlled, and the histological criteria were not standardized, making comparison between results difficult. The most potentially dangerous side effect was the nephrotic syndrome, which may develop after months or years of treatment. The most common histological type was minimal lesion nephropathy, and in several series glomerular immune complexes with immunoglobulin G (IgG), IgM, or C'3 have been demonstrated. In most cases, the lesion is slowly reversible after cessation of the drug. Other side effects included allergic-type rash, intracutaneous hemorrhage over pressure points, epidermolysis bullosa, elastosis perforans serpiginosa, loss of taste acuity, and nausea and vomiting. The use of penicillamine is limited by a high frequency of side effects, and will only find a major place in the management of CALD if it proves to be superior to prednisone or other currently used forms of immunosuppressive therapy in reducing both the inflammatory and the fibrotic component of the liver lesion.

5977 COMPARISON OF LAPAROSCOPIC AND SCINTIGRAPHIC FINDINGS IN CHRONIC HEPATITIS, IN LIVER CIRRHOSIS, AND IN HEPATIC TUMORS. (Ita.) Vido, I.; Hundeshagen, H. H.; Becker, H.; Schmidt, F. W. (Department Innere Medizin der Medizinischen Hochschule, 3 Hannover-Kleefeld, Karl-Wiechert-Allee 9, W. Germany). *Minerva Med.* 66(63):3253-3256; 1975.

5978 NOTES ON THE MODERN MANAGEMENT OF CHRONIC HEPATITIS. (Ita.) Di Silverio, C. (Provincial General Hosp., Sanremo, Italy). *Gaz. Med. It.* 134(7/8):328-335; 1975.

5979 PRELIMINARY RESULTS OF IMMUNOSUPPRESSIVE TREATMENT IN CHRONIC AGGRESSIVE HEPATITIS. (Pol.) Pokora, J.; Czarnecki, J.; Slomska, M.; Daniluk, J. (Klinika Gastroenterologiczna Instytutu Chorob Wewnetrznych AM, 20-950 Lublin, ul. Jaczewskiego 8, Poland). *Pol. Tyg. Lek.* 30(24):1027-1030; 1975.

5980 INTERRELATION BETWEEN CENTRAL HEMODYNAMICS AND HEPATIC BLOOD FLOW. (Rus.) Bogolyubov, V. M.; Timofeev, M. F.; Fomichev, V. I.; Klemashev, I. S. (Moscow Medical Inst. Stomatology, Moscow, USSR). *Klin. Med. (Mosk.)* 54(4):115-119; 1976.

5981 LIVER DISEASES IN THE LIGHT OF LABORATORY FINDINGS. (Ger.) Becker, K. (I. Medizinische Univ.-Klinik, 2 Hamburg 20, Martinistr. 52, W. Germany). *Med. Welt* 26(47):2141-2143; 1975.

5982 CIRCULATORY CONDITIONS IN THE LIVER IN CHRONIC HEPATITIS AND CIRRHOSIS AS REFLECTED BY VARIOUS METHODS OF EXAMINATION. (Cze.) Obermajer, J.; Kucera, J.; Drasilova, L. (Gastroenterologicke oddeleni MUNZ, 602 00 Brno, Ponavka 10, Czechoslovakia). *Vnitr. Lek.* 21(8):784-792; 1975.

5983 CHRONIC HEPATITIS. (Ger.) Affolter, H. (St. Clara-Spital, Med. Abteilung, Kleinriehenstrasse 30, 4048 Basel, Switzerland). *Praxis* 64(31):994-998; 1975.

5984 BEHAVIOR OF HBAg E AND OF HBAb IN CHRONIC HEPATITIS. (Ita.) De Bellis, G.; Di Martino, G.; Russo, N. (Laboratorio di Patologia Clinica, Ospedale Ascalesi, Naples, Italy). *Boll. Ist. Sieroter. Milan.* 55(2):164-167; 1976.

5985 CONSIDERATIONS ON "ACTIVE" CHRONIC HEPATITIS IN CHILDREN. (Fre.) Marchi, A. G.; Borrone, C.; Tecilazich, D.; Nordio, S. (Cattedra di Puericultura, Universita di Trieste, Trieste, Italy). *Med. Chir. Dig.* 5(2):95-100; 1976.

See also, 5949, 5990, 6010.

Alcoholic Liver Disease

5986 KARYOGRAMS OF NORMAL AND FATTY LIVERS IN MAN. (Ger.) Klinge, O.; Ross, W.; Struder, E. (Pathologisches Institut der Universitat, D-8700 Wurzburg, Josef-Schneider-Str. 2, W. Germany). *Virchows Arch.* [*Pathol. Anat.*] 366(3):203-222; 1975.

The karyograms of normal human livers (50 biopsies from patients of varied age) and of fatty livers (350 biopsies from patients with diabetes, alcoholism, and fatty cirrhosis) were investigated. The nuclear diameters were measured, and the cut surface of the nuclei was determined. The normal liver in each age group was characterized by a well-defined nuclear pattern that was specific for this organ. In the third decade, nuclei of the main class predominated. In later decades, two classes of large nuclei gradually appeared and reached their maximum after the 50th yr. In the seventh decade, a reduction of the cut nuclear surface took place in all the categories, presumably because of a reduction in function. The increase in the number of large nuclei was explained by abortive karyokineses, which in the course of the normal cell turnover, increasingly replace normal mitoses. This was attributed to disturbances of the achromatic apparatus, which occurs with increasing age. Alcoholic and diabetic, fatty change led to the formation of particularly large nuclei. This appeared to depend on the volume of the individual fat droplet within the individual cell rather than on the degree of change of the whole liver. Factors that may influence the formation of enlarged nuclei in the fatty liver include: the general tendency of the aging liver to form large nuclei, the toxic effect of alcohol on the hepatocytes in alcoholics with fatty liver, and the impairment of mitosis by the space-occupying effect of fat droplets. In addition to the impairment of mitoses, a pathologic swelling of the nucleus is assumed to contribute to the increased number of large nuclei seen in the karyogram. This swelling may be a result of the restructuring of the liver and/or of noxious stimuli. The increase in the number of small nuclei in the alcoholic or diabetic fatty liver, as well as in fatty cirrhosis, although marked, was not easily noted on scanning of the slide; only a numerical evaluation fully revealed its extent and significance. The increased number of small nuclei in the fatty livers was approximately equal. This increase may result from an adaptation of the cell to the increased functional load of the organ. In cirrhosis, an adaptation to an impaired metabolic state may also be involved.

5987 ELEVATED SERUM GAMMA-GLUTAMYL-TRANSFERASE (TRANSPEPTIDASE) AND HISTOLOGICAL LIVER DAMAGE IN ALCOHOLISM. (Eng.) Wu, A.; Slavin, G.; Levi, A. J. (Northwick Park Hosp. Clinical Res. Center, Burlington, Ontario, L7P 3B3 Canada). *Am. J. Gastroenterol.* 65(4):318-323; 1976.

The relation of serum gamma-glutamyl-transferase (transpeptidase, GGTP) activity to other biochemical liver function tests and to histological liver damage was investigated in 66 alcoholic patients (949 men, 17 women, aged 30-78 yr). Blood samples were taken from and percutaneous liver biopsy was performed on all patients. Elevated serum GGTP was the most common finding (74%), and the only finding in seven patients. There were significant correlations between serum GGTP and serum aspartate aminotransferase (AsT, $p<0.01$) and alkaline phosphatase (AP, $p<0.01$). No significant correlation was seen between the average daily alcohol consumption and serum GGTP ($p>0.05$). On liver biopsy, 6 patients had normal livers, 22 showed fatty change, 12 showed severe hepatofibrosis, 8 showed alcoholic hepatitis, and 18 showed cirrhosis. Serum GGTP elevation was most common among the cirrhotics (17 of 18). The mean serum GGTP value was statistically different from normal ($p<0.005$) and fatty change ($p<0.05$) groups. Elevated serum GGTP levels were present in 9 of 19 patients without histological evidence of cellular necrosis, but other histological abnormalities were present in 8 of the 9. The results show that while elevated serum GGTP levels in alcoholism may be partly related to structural liver damage, other mechanisms, such as hepatic microsomal enzyme induction or alcoholic pancreatic damage, may also play a role.

5988 HEPATITIS B VIRUS INFECTION IN THE WISKOTT-ALDRICH SYNDROME. (Eng.) Gerety, R. J.; Poplack, D. G.; Hoofnagle, J. H.; Blaese, R. M.; Holland, P. V.; Barker, L. F. (Div. Blood and Blood Products, Bureau Biologics, 8800 Rockville Pike, Bethesda, MD 20014). *J. Pediatr.* 88(4, part 1): 561-564; 1976.

Because of the immunologic deficits demonstrated by children with the Wiskott-Aldrich syndrome, and because of their frequent exposure to hepatitis B virus (HBV) in the course of transfusion therapy for thrombocytopenia, the sera of 12 patients with this syndrome were tested for evidence of HBV infection. All but one of the 12 children had received multiple transfusions. Evidence of HBV infection was found in three patients, all of whom had received multiple transfusions. The first patient had hepatitis B surface antigen (HBsAg, subtype *adw*), which persisted for at least 3 months; antibody to hepatitis B core antigen (anti-HBc) was subsequently detected and rose to a high titer (1:128) before declining and becoming undetectable at bleedings 2-4 yr later. Antibody to HBsAg (anti-HBs) was first detected at the 2-yr follow-up. The serum of the second patient was positive for anti-HBs and anti-HBc, the former remaining persistent. HBsAg was not detected. The serum of the third patient revealed only anti-HBs, which persisted at a low titer until his death 2 months later. In the first two patients, liver function tests revealed mildly elevated SGOT (85-321 Karmen U in the first patient; 64-93 u s/b in the second patient) and SGPT (87-232 and 82-85

Karmen U, resp.), but bilirubin levels were normal. It was obvious that these three children had not experienced severe viral hepatitis and had not developed the chronic HBsAg carrier state. The data suggest that the immunologic defect present in Wiskott-Aldrich patients does not predispose to severe clinical type B hepatitis or to the chronic carrier state.

5989 ENZYME INDUCTION IN ALCOHOLIC AND CRYPTOGENIC CIRRHOSIS. (Spa.) Marin, P. E.; Rossi, I.; Mirave, I. A. (Clinica Puerta de Hierro, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(3): 329-336; 1976.

5990 CLINICAL EXPERIENCE WITH SILYMARIN IN THE TREATMENT OF CHRONIC LIVER DISEASE. (Ger.) Reutter, F. W.; Haase, W. (Klinik B., Kantonsspital, CH-9000 St. Gallen, Switzerland). *Praxis* 64(36): 1145-1152; 1975.

5991 ACIDOSIS OF THE RENAL TUBULI AND ALCOHOLIC HEPATOPATHIES. (Fre.) Vesin, P.; Guerou, J.; Dervichian, M.; Agar, D.; Azogui, M.; Cattan, D. (Hopital-Sud, F 94190 Villeneuve-Saint-Georges, Creteil, France). *Arch. Fr. Mal. Appar. Dig.* 64(8): 707; 1975.

LIVER AND BILIARY TRACT

Cirrhosis

5992 BILIARY CIRRHOSIS: NOSOGRAPHIC AND THERAPEUTIC CHARACTERISTICS. (Ita.) Grossi, F.; Messini, F. (Scuola de Specializzazione in Malattie del Fegato e del Ricambio, Universita di Roma, Rome, Italy). *Clin. Ter.* 75(3):291-303; 1975.

Biliary cirrhoses are divided into two groups: primary biliary cirrhosis, and cirrhosis caused by extrahepatic and intrahepatic primary sclerosing cholangitis, by sclerosing cholangitis, and by chronic cholestasis. The morphology, pathogenesis, and clinical symptoms of primary biliary cirrhosis are reviewed. Therapy emphasizes symptomatic treatment of pruritus and malabsorption of fats, liposoluble vitamins, and calcium; pathogenetic cures are being sought.

5993 ORNITHINE CARBAMOYLTRANSFERASE (O.C.T.) IN HEPATIC CIRRHOSIS, COMPARED TO OTHER ENZYMATIC TESTS. (Ita.) De Simone, E.; Casolaro, M.; Belli, M. G. (Ospedali Riuniti di Napoli, Naples, Italy). *Rass. Int. Clin. Ter.* 55(11): 663-668; 1975.

Ornithine carbamoyltransferase (OCT) serum levels were examined in 63 patients with hepatic cirrhosis at various stages. The levels of OCT are indicative of the activity of the disease even in cases of apparent clinical compensation and normal transaminases. Variations in the serum level of OCT are indicative of disorders of the mitochondria, which are independent of lysis phenomena of the membrane or of necrosis of the cell. This characteristic distinguishes OCT from the lysis enzymes, glutamic-pyruvic transaminase and glutamic-oxaloacetic transaminase, also measured in the serum of these patients. Alcoholic cirrhosis causes frequent and notable rises in OCT and the enzyme, gamma glutamyl transpeptidase (gamma GT). This is due to increased induction for gamma GT and to lesions of the mitochondria for OCT.

5994 THE VALUE OF THE USE OF AN ACIDIFIER IN DIURETIC TREATMENT IN THE COURSE OF THERAPY FOR CIRRHOSES. (Fre.) Bonvarlet, P. (Service de la Clinique des Maladies de l'Appareil Digestif, Hopital Regional, Centre Hospitalier Universitaire, 59000 Lille, France). *Entretiens Bichat Ther.* 1975: 133-136.

Twenty-seven patients with cirrhosis (17 with jaundice, edema, ascites, and oliguria; 10 with ascites and oliguria; and 3 with encephalopathy) were administered arginine hydrochloride either by perfusion (25 g/day) or p.o. (25-30 g/day) in addition to i.v. or p.o. furosemide. Doses of furosemide varied according to the diuresis required. While recovery of diuresis in patients treated i.v. was excellent, acidosis was rapid and difficult to control, and electrolyte balance disturbances, especially hypokalemia, were major. Complications in patients treated p.o. were not as marked nor was the recovery of diuresis. While ascites disappeared, jaundice persisted. Encephalopathy remained unchanged. The study confirmed the acidifying role of arginine as well as its beneficial effect on diuresis.

5995 EFFECTS OF ANTICOPPER THERAPY ON HEPATOCELLULAR MITOCHONDRIA IN PATIENTS WITH WILSON'S DISEASE: AN ULTRASTRUCTURAL AND STEREOLOGICAL STUDY.

(Eng.) Sternlieb, I.; Feldmann, G. (Albert Einstein Coll. Medicine, 1300 Morris Park Ave., Bronx, NY 10461). *Gastroenterology* 71(3): 457-461; 1976.

Ultrastructural findings in hepatocellular mitochondria of seven patients with Wilson's disease were compared by means of stereological techniques before and after anticopper treatment. Needle biopsies were taken before and after 3-5 yr of therapy with p.o. D-penicillamine and a low copper diet. Electron photomicrographs were made, and for stereological analysis, were projected onto a screen at a magnification of 24,000 x. Profound mitochondrial abnormalities, initially present in four of the patients, were reduced in severity and frequency in three; slight improvement occurred in two others. Hepatic copper concentrations decreased markedly in three patients, correlating with morphological improvement. Stereological analysis showed that the mean volume density of mitochondria was 18.2% before and 19.3% after treatment. Values in a normal control group were 17.03%. The mean surface density of external mitochondrial membranes was 1.15 μ^2/μ^3 before and 1.32 μ^2/μ^3 after treatment (control, 1.03 μ^2/μ^3). The mean surface-to-volume ratio was 6.22 μ^2/μ^3 and 6.67 μ^2/μ^3 after treatment (control, 6.13 μ^2/μ^3). The ranges of counts of mitochondrial profiles per unit surface overlapped: 0.25-0.47 and 0.03-0.48 mitochondria/μ^2 in pre- and post-treatment specimens, resp. The results show that improvement of certain cytological abnormalities is detectable at an ultrastructural level and also imply that the mitochondrial changes are the result of copper toxicity.

5996 COMPARISON OF VITAMIN D AND 25-HYDROXY-VITAMIN-D IN THE THERAPY OF PRIMARY BILIARY CIRRHOSIS.

(Eng.) Wagonfeld, J. B.; Bolt, M.; Boyer, J. L.; Nemchausky, B. A.; Vander Horst, J.; Rosenberg, I. H. (Section Gastroenterology, Univ. Chicago, Chicago, IL 60637). *Lancet* 2(7982):391-393; 1976.

The serum 25-hydroxy-vitamin D and bone mineral content were determined in eight women (aged 35-62 yr) with primary biliary cirrhosis, and the effect of p.o. and parenteral vitamin D therapy was compared with that of p.o. 25-hydroxy-vitamin D therapy. Skeletal mineralization was assessed in each patient by metacarpal cortical thickness and by proton-beam absorption. Serum 25-hydroxy-vitamin D levels were determined by a competitive protein-binding method. The patients had a mean cortical thickness (3.60 mm) and an absorption coefficient (1.82 cm^{-1}), which was significantly less than those of 17 age- and sex-matched controls (5.11 mm and 2.08 cm^{-1}, resp.). In six untreated patients with primary biliary cirrhosis, the mean serum 25-hydroxy-vitamin D level was 4.4 ng/ml, significantly less than in the controls (23.8 ng/ml). During 3 months of therapy with s.c. vitamin D (100,000-500,000 U/month), the patients' mean absorption coefficient decreased 10%. After p.o. 25-hydroxy-vitamin D (100-200 μg/day) therapy for 3 months, the coefficient increased by 5%. None of the six patients in whom both pre- and post-treatment samples were available, responded to 3-6 months of either p.o. or s.c. vitamin D with an elevation in the serum level of 25-hydroxy-vitamin D. At the end of 3-6 months, a decrease in bone mineral content greater than 2% occurred in all but two patients. Only one patient with a normal serum 25-hydroxy-vitamin D level after s.c. vitamin D therapy showed improvement in bone mineral content. In contrast, all patients responded to 25-hydroxy-vitamin D, with a rise in serum 25-hydroxy-vitamin D levels to normal or high values. The linear absorption coefficient either increased or remained stable in all but one patient. 25-Hydroxy-vitamin D therapy may be the preferred form of vitamin D therapy in primary biliary cirrhosis.

5997 PORTACAVAL ANASTOMOSIS FOR ASCITES: 16 CASES.

(Fre.) Levy, V. G.; Theodore, C.; Hivet, M.; Hautefeuille, P.; Huguet, C.; Caroli, J. (Hopital St.-Antoine, 184, rue Fg Saint-Antoine, 75012 Paris, France). *Med. Chir. Dig.* 4(2):93-98; 1975.

Sixteen patients with ascites (12 cirrhoses and 4 Budd-Chiari syndromes) underwent portacaval anastomosis (9 termino-terminal, 4 latero-lateral, and 3 mesenterio-caval with a dacron prosthesis). There were four deaths within 2 months (1 electrolyte imbalance, 2 infections, and 1 untimely surgery), three within 3-4 months (1 hepatic deterioration and 2 ascites with thrombosed or inadequate anastomoses); two patients died 30 and 88 months later, resp., of nonhepatic causes (1 amylosis and 1 hemorrhaging bulbous ulcer). The remaining seven patients were cured, although a few moderate transitory ascites did occur. Better pre- and postoperative care should be provided to avoid loss of fluid during surgery and electrolyte disorders.

5998 CHECKING THE PERMEABILITY OF SURGICAL PORTA CAVAL ANASTOMOSES BY ARTERIOGRAPHY.

(Fre.) L'Hermine, C.; Vankemmel, M.; Quandalle, P.; Dehaene, J. L.; Maillard, J. P. (C.H.U., F 59000 Lille, France). *J. Radiol. Electrol. Med. Nucl.* 57(3):219-225; 1976.

Arterioportography is recommended as a technique preferable to phlebography for checking the success of portacaval anastomoses. The procedure, simple and safe, was performed in 18 anastomoses (11 splenorenal, 3 terminoterminal portacaval, 2 laterolateral portacaval, and 2 mesenteriocaval). It was always possible to determine whether the anastomosis was permeable, by visibility of the anastomosis and/or opacification of the lower vena cava. The nonvisibility of the anastomosis and of the lower vena cava and the opacification of varicosis are signs of a nonfunctional anastomosis. The quality of the opacification is somewhat inferior to that of selective phlebography by the caval route. Arteriography provides important hemodynamic data on the functioning of the anastomosis and on portal circulation.

999 IMMUNOLOGICAL STUDIES IN FAMILIAL PRIMARY BILIARY CIRRHOSIS. (Eng.) Tong, M. J.; ies, K. M.; Reynolds, T. B.; Quismorio, F. P. (John esley Hosp., 2826 South Hope St., Los Angeles, CA 0007). *Gastroenterology* 71(2):305-307; 1976.

ests for cell-mediated immunity and the presence f autoantibodies were performed in a 63-yr-old other and her 38-yr-old daughter, who both had rimary biliary cirrhosis. Their case histories re presented. Lymphocyte transformation to hytohemagglutinin, delayed cutaneous response to ne or more skin test antigens, and the percentage f peripheral thymus-derived (T) and bone marrow-erived (B) lymphocytes were normal in both patients. lthough successful in the mother, dinitrochloro-enzene sensitization was not achieved in the aughter. Histocompatibility antigens 1 and 8, ele-ated levels of immunoglobulin M (0.34 in the daughte .42 in the mother), and antibodies to mitochondria, mooth muscle, and skeletal muscle were present in oth patients. The clinical course was more severe n the daughter, who developed portal hypertension ith bleeding esophageal varices requiring porta-aval anastomosis. Except for intermittent ruritus, the mother has remained asymptomatic.

000 ACTIVE AND PASSIVE FIBROUS SEPTA IN MAJOR HEPATIC FIBROSIS IN MAN: DETECTION OF OLLAGEN HYPERFIBERS WITH ELECTRON MICROSCOPY. (Fre.) eyrol, S.; Grimaud, J.-A.; Borojevic, R. (Institut asteur de Lyon, 77, rue Pasteur, 69007 Lyon, France). *.R. Acad. Sci.* [*D*] *(Paris)* 282(3):333-336; 1976.

he ultrastructural study of severe hepatic fibrosis evealed collagen hyperfibers, characterized by their arge diameter, in the septa. These hyperfibers may erve as a qualitative evaluation of the fibrosis, n terms of stability and potential reversibility. he conditions accompanying their elaboration, in-ense inflammation and fibrogenesis, are always igns of poor prognosis. There are two possible nterpretations of the morphogenesis of collagen in he conjunctive tissue: (1) The collagen hyper-ibers may represent *in vivo* disorganization of the ollagen fibers, secondary to enzyme liberation odifying the microenvironment of the fibers. Thus, he hyperfibers may be a result of fiber alteration, reliminary to the accelerated fibrolysis of inter-titial or cellular origin, indicating the rapid re-ersibility of the fibrosis. (2) The fibers may be result of hyperpolymerization of collagen fibrils. he hyperfibers would then represent a form of col-agen more stable than the normal fiber, and the ossibility of a rapid reversal of the fibrosis ould be eliminated.

001 CHANGES OF EEG AND PULMONARY VENOUS ADMIXTURE DURING A PROTEIN LOAD IN PATIENTS ITH CIRRHOSIS. (Eng.) Schomerus, H.; Buchta, I.; rndt, H. (Medizinische Universitatsklinik, Otfried-uller-Strasse, D-7400 Tubingen, W. Germany). *Eur. . Clin. Invest.* 5(6):515-520; 1975.

tudies were carried out to determine whether minor EEG slowing induced by a protein load in 21 patients with cirrhosis was associated with a measurable increase in venous admixture. These patients and 24 age-matched controls were studied before and after a protein load (120 g protein/day for 1 week). An EEG was recorded, and a visual assessment of frequency pattern was performed. Venous admixture was estimated during hyperoxia. According to the EEG frequency pattern, the patient group with cirrhosis was subdivided into seven patients with EEG slowing after the protein load and 14 without. The resting arterial blood gases were not significantly different in the two groups. After the protein load, all cirrhotic patients had a mean alveolar arterial oxygen difference ($AaDO_2$), that was significantly higher than controls ($p<0.025$). The increase in $AaDO_2$ was significantly larger in cirrhotics showing EEG slowing than in those without EEG slowing ($p<0.01$) or controls ($p<0.01$). The fractional venous admixture was increased significantly in cirrhotics with EEG slowing, compared with that in cirrhotics without slowing and with controls. The results confirm earlier findings that intrapulmonary venous admixture is not a constant phenomenon, but a rapidly changing functional parameter in patients with chronic liver disease.

6002 LITHOGENOUS BILE AND LIVER CIRRHOSIS. (Fre.) Solis-Herruzo, J. A. (Hospital Clinico de la Facultad de Medicina de Madrid, Universidad Complutense, Madrid, Spain). *Med Chir.* 4(4):211-217; 1975.

The composition of the gallbladder bile of 29 cirrhotic patients (15 septal cirrhoses and 14 postnecrotic cirrhoses) and of 11 normal subjects was studied. Samples were obtained by puncture during laparoscopy. Results show that in the cirrhotic patients the incidence of gallbladder lithiasis was high (24%). The bile frequently contained cholesterol microcrystals (69%), a condition that favors the formation of cholesterol calculi. Cholesterol excretion was normal while that of phospholipids was very high ($p<0.001$) and that of biliary acids very low ($p<0.001$). Lipids exceeded the micellar zone of Small's triangle in 69% of the patients. The micellar instability of the bile in cirrhotic patients combined with an excess of bilirubin may be responsible for the higher incidence of gallbladder lithiasis in these patients. Other factors, such as stasis of bile, may also contribute to the formation of calculi.

6003 MASSIVE SPLENIC INFARCTION IN CIRRHOSIS: REPORT OF A CASE WITH SPONTANEOUS DISAPPEARANCE OF HYPERSPLENISM. (Eng.) Capron, J.-P.; Chivrac, D.; Dupas, J.-L.; Remond, A.; Ossart, J.-L.; Lorriaux, A. (Clinique Medicale A, Centre Hospitalier Universitaire, 1 Place Victor Pauchet, 80030 Amiens Cedex, France). *Gastroenterology* 71(2):308-310; 1976.

The case of a 45-yr-old male cirrhotic patient with massive splenic infarction is described. The patient presented with melena. Celiac angiography showed a normally opacified splenic artery and vein and a markedly enlarged spleen with large avascular zones. Splenic infarction was associated with the spontaneous disappearance of a syndrome of hypersplenism. Splenectomy was performed. Histological examination showed large foci of hemorrhagic necrosis, with multiple thromboses of the small arterial and venous vessels. The cause of this infarct remains unclear. This case may serve as a warning against the injudicious use of splenic artery embolism, because massive splenic infarction, with its dangers of splenic rupture, peritoneal hemorrhage, and splenic suppuration, may require splenectomy.

6004 INTRAHEPATIC ARTERIOPORTAL FISTULA SECONDARY TO A PORTAL THROMBOSIS IN CIRRHOSIS. (Fre.) Paris, J. C.; L'Hermine, C.; Tonnel, A. B.; Dehaene, J. L.; Plouvier, B.; Pagniez, B.; Pommelet, P. (Clinique des Maladies de l'Appareil digestif, C.H.U., F 59000 Lille, France). *J. Radiol. Electrol. Med. Nucl.* 57(3):227-232; 1976.

The case of a 62-yr-old woman with cirrhosis accompanied by an abundant recurring pleural effusion is reported. Celiac arteriography revealed a massive intrahepatic arterioportal fistula in the region of a segment of the left hepatic lobe. Subsequent arteriography detected stagnation of the contrast medium in the left branch of the portal vein which was opacified from the fistula up to the hilar region. It was impossible to study the portal system angiographically due to a complete atheromatous thrombosis of the superior mesenteric artery. The portal thrombosis was only suspected due to the stagnation of the contrast medium and to the absence of any other cause for a traumatic or tumoral fistula. The patient died a few days later from hepatic insufficiency. A complete thrombosis of the portal trunk and a micronodular atrophic cirrhosis were revealed at autopsy. There were no other intrahepatic lesions capable of explaining the arterioportal fistula.

6005 SIGNIFICANCE OF THE PHENOMENON OF EXTRAHEPATIC FIXATION OF COLLOIDS OBSERVED IN SCINTIGRAPHY. (Rum.) Chicos, G.; Popovici, O. (Institutul Oncologic, Bucharest, Rumania). *Oncologia (Bucur.)* 15(1):29-34; 1976.

6006 SPLENOHEPATOPLASTY IN THE TREATMENT OF HEPATIC CIRRHOSIS. (Rum.) Stoica, T.; Voicu, Fl.; Laky, D.; Stadnicov, O.; Ursu, M.; Sorescu, I.; Stoica, D. (Sectia de chirurgie, Spitalul nr. 1, Braila, Rumania). *Chirurgia (Bucur.)* 25(3):175-182; 1976.

6007 LONG-TERM RESULTS OF THE SURGICAL TREATMENT OF CHILDREN WITH LIVER CIRRHOSIS. (Rum.) Simonishvili, A. Sh.; Meshek, A. B.; Leont'ev, A. F.; Diukova, I. I. (Inst. Pediatrics, USSR Acad. Medical Sciences, Moscow, USSR). *Pediatriia* (3):70-72; 1976.

6008 THE PRESENT STATUS OF PORTAL VEIN SURGERY IN LIVER CIRRHOSIS. (Ger.) Matzander, U. (Chirurgische Klinik des Friedrich-Ebert-Krankenhauses, D-2350 Neumunster, Sachsenring 1, W. Germany). *Leber Magen Darm* 5(5):214-222, 1975.

6009 SURGICAL TREATMENT OF PORTAL HYPERTENSION WITH ASCITES BY ILEOVESICOPEXY: EXPERIMENTAL STUDY. (Rus.) Avdei, L. V.; Rubakhov, O. I. (Minsk Medical Inst., Minsk, USSR). *Klin. Khir.* (2):23-26; 1976.

6010 HUMORAL IMMUNE REACTIONS IN CHRONIC LIVER DISEASES. (Ger.) Kratzsch, K.-H.; Zimmermann, S.; Morenz, J.; Furstenau, M.; Zegehor, M.; Claus, B.; Lewicki, I. (Med. Klinik, Klinikum am Kuchwald, 90 Karl-Marx-Stadt, Burgerstrasse 2, E. Germany). *Z. Gesamte Inn. Med.* 31(14):533-535; 1976.

6011 CLINICAL ANALYSIS OF CASES OF DECOMPENSATED LIVER CIRRHOSIS. (Pol.) Milewski, B.; Krygier, T.; Habior, A.; Ruzyllo, E. (Klinika Gastroenterologii i Przemiany Materii CMPK, 02-616 Warsaw, ul. Goszczynskiego 1, Poland). *Pol. Tyg. Lek.* 31(31):1329-1331; 1976.

6012 COMPARATIVE STUDIES OF INTRAHEPATIC HEMODYNAMICS IN CHILDREN WITH CIRRHOSIS OF THE LIVER AND IN CHRONIC CARDIOVASCULAR INSUFFICIENCY. (Rus.) Oskolkova, M. K.; Azizova, D. S. (Scientific Res. Inst. Pediatrics, USSR Acad. Medical Sciences, Moscow, USSR). *Vopr. Okhr. Materin. Det.* 21(5):59-64; 1976.

6013 RESORPTIVE FUNCTION OF THE SMALL INTESTINE IN LIVER CIRRHOSIS IN CHILDREN. (Rus.) Ryzhkova, L. A.; Alimova, M. M. (Inst. Pediatrics, USSR Acad. Medical Sciences, Moscow, USSR). *Pediatriia* (3):64-66; 1976.

6014 URINARY EXCRETION OF CATECHOLAMINES IN PATIENTS WITH CHRONIC HEPATOCELLULAR DAMAGE DUE TO CIRRHOSIS. (Pol.) Stelmasiak, T. (Klinika Ogolna Chorob Wewnetrznych Instytutu Chorob Wewnetrznych AM, 20-081 Lublin, ul. Staszica 16, Poland). *Pol. Tyg. Lek.* 31(30):1281-1283; 1976.

6015 CIRRHOSIS OF THE LIVER WITH PORTAL HYPERTENSION. (Fre.) Weber, I.; Fabre, J. (Policlinique universitaire de medecine, 25, rue Micheli-du-Crest, 1211 Geneve 4, Switzerland). *Praxis* 64(51):1633-1638; 1975.

6016 HEPATIC COMA IN PATIENTS WITH LIVER CIRRHOSIS. (Spa.) Folino, A.; Muniz, J.; Schwarzbock, H.; Cestoni, J.; Acosta, M.; Bascope, M.; Meeroff, M. (Hospital V. de Lanus, Buenos Aires, Argentina). *Galicia Clin.* 47(8):618-623; 1975.

See also, 5874, 5887, 5889, 5900, 5947, 5951, 5977, 5980, 5982, 5986, 5989, 5990, 6021, 6046, 6115.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

6017 VISCOSITY AND OSMOLALITY OF ABNORMAL BILES. (Eng.) Cowie, A. G. A.; Sutor, D. J. (Univ. Coll. Hosp. Medical Sch., Univ. St., London WC 1, England). *Digestion* 13(5):312-315; 1975.

The osmolality and viscosity of gallbladder and common duct bile were measured and related to the gallbladder function and gallstone composition of 28 patients undergoing surgery for gallstone disease. The osmolality of the bile was estimated by measuring the depression of the freezing point, and the relative viscosity was measured at room temperature using a capillary viscometer. The mean relative viscosity of bile in patients with nonfunctioning gallbladders (15.09 ± 4.17, 17 measurements) was greater than in patients with functioning gallbladders (7.30 ± 2.89, 7 measurements, $p<0.02$), and the mean osmolality in patients with nonfunctioning gallbladders (296 ± 6 mOsm/1, 16 measurements) was less than in those with functioning gallbladders (324 ± 10 mOsm/1, 7 measurements, $p<0.001$). Although this trend was seen when the patients were divided into groups according to the type of gallstone (cholesterol, cholesterol + calcium, or calcium salts), the differences were not significant. There were no significant differences in the mean viscosity and osmolality of biles associated with the different types of stones. The mean viscosity of bile from both functioning and nonfunctioning gallbladders for all patients was greater than that of bile from the common duct (1.41 ± 0.07). These and previously reported studies suggest that the mucus content of the gallbladder can vary considerably and that it is usually greater in nonfunctioning gallbladders.

6018 EFFECT OF CALCIUM ION ON THE STATE OF SOLUTION AND CHOLESTEROL SOLUBILIZATION IN BILE. (Jpn.) Itoh, H. (Faculty Medicine, Kyushu Univ., Fukuoka, Japan). *Fukuoka Acta Med.* 66(5):351-367; 1975.

The effect of the calcium ion on the solution state of bile and its cholesterol solubilization was studied using a model bile (aqueous bile salt-lecithin solution) and human bile. The model bile was composed of 46.5 mM of sodium cholate, sodium chenodeoxycholate, or sodium deoxycholate aqueous solutions, with or without 8.6 mM lecithin. By adding calcium chloride to the model bile solutions, the formation of gel and precipitation was examined in relation to the calcium ion concentration. Gel formation occurred in the sodium cholate system with the addition of calcium chloride. The minimum calcium concentration for gelation in the sodium cholate without lecithin system was 16 mM; it was 45 mM when with lecithin. No gel formation could be observed in the sodium deoxycholate-calcium system, but precipitation occurred with the addition of the calcium ion. The minimum calcium concentration for precipitation formation was 1.5 mM in the system with lecithin and 5 mM in the system without it. The time required for gel formation increased as the calcium ion concentration decreased. Gel formation occurred in less than 30 min when 30 mM calcium was used in sodium cholate, and it was about 300 min when 20 mM calcium was used. By using an isolated human bile, the effect of calcium on cholesterol solubilization was examined. Human bile (5 ml) and cholesterol powder (3 ml) were placed in an ampule together with various concentrations of calcium chloride solution. The ampule was shaken for 48 hr at 20 C, and the solution was analyzed for the concentrations of solubilized cholesterol, cholate, deoxycholate, chenodeoxycholate, lecithin, and calcium. The concentration of solubilized cholesterol did not show a clear change up to the addition of 5 mM calcium. When the addition of calcium was greater than 10 mM, the concentration of solubilized cholesterol decreased as the calcium increased; the cholesterol concentration was 1.94 and 1.06 mM when the calcium concentration used was 10 mM and 100 mM, resp. The cholate concentration changed from 14.1 to 12.7 mM when the calcium concentration was changed from 2 to 100 mM.

6019 ACTION OF METHYL-4-UMBELLIFERONE ON THE HYDRODYNAMICS OF THE COMMON BILE DUCT IN MAN: PEROPERATIVE RADIOMANODEBITMETRIC STUDY. (Fre.) Vayre, P.; Hureau, J. (Clinique Therapeutique Chirurgicale, Hopital Vaugirard, rue de Vaugirard, 75015 Paris, France). *Med. Chir. Dig.* 3(4):293-297; 1974.

The immediate effect of an i.v. injection of 0.6 g of methyl-4-umbelliferone on common bile duct (CBD) hydrodynamics was studied in 105 patients undergoing biliary surgery. There was a 10-50% fall in pressure in all but 34/38 normal CBD, 6/12 hypotonic CBD, 12/12 mixed hypertonias, and 35/35 functional hypertonias; there was no effect in 8/8 organic hypertonias. Methyl-4-umbelliferone can be used when the cardiovascular condition of a patient proscribes amyl nitrite. In functional hypertonias, it can be used peroperatively as a pharmacodynamic test as it normalizes manometric results. Use of the drug in medical treatment of biliary dyskinesis should be explored since the present study confirms the myorelaxant and spasmolytic effect of methyl-4-umbelliferone on the common bile duct and the sphincter of Oddi.

6020 FLOW RATES AND MANOMETRY IN BILIARY SURGERY.

(Eng.) White, T. T. (Univ. Illinois, Medical Center, Chicago, IL). *Chir. Gastroenterol.* 9(4):469-473; 1975.

The value of biliary manometry and the determination of flow rates in the detection of common bile duct pathology were assessed in 300 patients undergoing biliary surgery. The value of cholangiography was also determined. A simplified flow and pressure apparatus, which consists of a 50-ml syringe, a length of plastic tubing, and a plastic needle, was used. The average resting pressure in a normal common bile duct was 11.8 cm, and in obstructed ducts, 18.4 cm. The flow in the normal duct was 23.0 and in the obstructed ducts 5.8. Of the 200 patients who were followed up for 3-5 yr, 131 had normal flow and pressure and normal ducts with no stones at surgery. Abnormal flow and pressure and abnormal ducts were seen in 30 patients. The results were equivocal in 19 patients, and technical failures occurred in the remaining 20 patients. The accuracy of cholangiography alone in the detection of bile duct pathology was 89%. The overall accuracy of pressure determination alone was 93%, for flow determination 93%, and for combined flow and pressure determination 94.5%. Among the patients followed up for 3-5 yr, there were 22 patients complaining of pain after eating, thought to be due to colitis or duodenal ulcer. The authors conclude that biliary manometry and flow rate determinations are useful methods for screening as a supplement to cholangiography in apparently normal people.

6021 BILE DUCT CARCINOMA MIMICKING CHRONIC LIVER DISEASE.

(Eng.) Pelleya-Kouri, R.; Dusol, M., Jr.; Orta, D.; Pereiras, R.; Clark, R.; Schiff, E. R. (Univ. Miami Sch. Medicine, Miami, FL). *Arch. Intern. Med.* 136(9):1051-1054; 1976.

The case of an 84-yr-old man with cholangiocarcinoma at the confluence of the major hepatic ducts is reported. The patient had experienced three separate episodes of jaundice, each of which had cleared spontaneously without specific therapy. During one episode, the total serum bilirubin, serum alkaline phosphatase, and SGOT levels rose to as high as 10.4 mg/100 ml (direct, 7.6 mg/100 ml), 880 mIU/ml, and 425 mIU/ml, resp., before returning to normal. There was one unusually long anicteric interval of at least 14 months. A liver biopsy performed during the first episode of jaundice showed pronounced pericholangitis and centrilobular cholestasis, which were considered to be consistent with extrahepatic obstruction. The results of a liver scan were normal. During another episode of jaundice, a percutaneous transhepatic cholangiogram disclosed partial obstruction of the left hepatic duct, close to the bifurcation at the porta hepatis. Although a bile duct carcinoma was suspected, surgery was not performed. At the patient's final hospitalization, emergency endoscopy showed bleeding esophageal varices. The results of a liver scan were consistent with hepatic cirrhosis and portal hypertension. Hepatic encephalopathy rapidly ensued, and total serum bilirubin, serum alkaline phosphatase, and SGOT levels rose to 26 mg/100 ml, 1,020 mIU/ml, and 300 mIU/ml, resp. At autopsy, an adenocarcinoma was found at the confluence of the major hepatic ducts. Histological examination revealed invasion of cholangiocarcinoma into the ducts and vascular channels with desmoplastic changes. A 1.3-cm cyst was found distal to the cystic duct and just after the formation of the common bile duct, which negates the possibility that the cyst contributed to the intermittent mechanical obstruction at the bifurcation. Other possible mechanisms might have been edema and inflammation of the ductules and/or spasm of the smooth muscle in the large ducts. The hyperbilirubinemia in this patient appears to involve more than just simple mechanical obstruction of the biliary tree.

6022 MARKED INCREASE IN SERUM LEVELS OF LIVER ENZYMES IN PATIENTS RECEIVING CHENIC ACID AND PHENOBARBITAL FOR GALLSTONE DISSOLUTION.

(Eng.) Menghini, G.; Pallotta, B. (General Provincial Hosp., Macerata, Italy). *Digestion* 14(2):163-169; 1976.

Three of 16 patients receiving chenic acid (20 mg/kg/day) and phenobarbital (60 mg/day) for gallstone dissolution developed marked increases in serum SGOT-SGPT and alkaline phosphatase levels without associated symptoms. In the three patients, the elevated serum SGOT levels ranged between 210 and 1,350 mIU/ml; SGPT ranged between 600 and 1,400 mIU/ml; and alkaline phosphatase ranged between 77 and 309 King-Armstrong U. Liver biopsy in one patient showed cellular infiltration with neutrophils and eosinophils, suggestive of a hypersensitivity reaction. Enzyme levels returned to normal following cessation of chenotherapy, and a second biopsy 3 months later was normal. In this patient, a challenge with chenic acid (250 mg/day) was again followed by a marked elevation in SGOT-SGPT and alkaline phosphatase. These patients are the first to show marked elevation in liver enzyme levels during chenotherapy, and the mechanism and significance are unclear.

6023 PREVALENCE OF CHOLELITHIASIS IN MEN AND WOMEN INGESTING A SERUM-CHOLESTEROL-LOWERING DIET.

(Eng.) Miettinen, M.; Turpeinen,

O.; Karvonen, M. J.; Paavilainen, E.; Ekosuo, R. (Coll. Veterinary Medicine, Hameentie 57, SF-00550, Helsinki 55, Finland). *Ann. Clin. Res.* 8(2):111-116; 1976.

The prevalence of gallstones was studied in autopsied male and female patients of two mental hospitals to determine whether a serum cholesterol-lowering diet is conducive to cholelithiasis. In the experimental diet, ordinary milk was replaced by an emulsion of soybean oil in skim milk, and butter and ordinary margarine were replaced by a soft margarine with a high polyunsaturated fatty acid content. The fatty acid compositions were very different in the two diets, The prevalence of gallstones was 22.5% in men on the cholesterol-lowering diet (20 of 89) and 25% of those on a normal diet (11 of 44); in women 42% on the cholesterol-lowering diet had gallstones (151 of 262), while 47% of those on a normal diet did (29 of 62). Men on the normal diet were somewhat younger (difference of 2.7 yr in the median age), while women were more nearly of the same age (difference of 0.8 yr in the median age). No significant correlation was found between gallstones and obesity. It is concluded that the cholesterol-lowering diet was not lithogenic.

6024 ENDOSCOPIC CHOLANGIOGRAPHY IN THE DIAGNOSIS OF OBSTRUCTIVE JAUNDICE. (Jpn.) Ohishi, H.; Sunagawa, M.; Hachiya, T.; Aburatani, R.; Miyata, Y.; Miura, T.; Utimoto, I.; Toyoda, T.; Fukai, Y. (Nara Medical Univ., Nara, Japan). *J. Nara Med. Assoc.* 25(4/5):343-349; 1974.

The diagnosis of four cases of obstructive jaundice by endoscopic cholangiography is reviewed. In the first case, a 65-yr-old man was diagnosed as having obstructive jaundice due to stones in the common bile duct. In the second case, a 61-yr-old man had developed obstructive jaundice due to a malignant tumor in the biliary tract, complicated by stones in the biliary tract. In the third case, a 66-yr-old man also developed obstructive jaundice due to a tumor; his case was complicated by the presence of stones in the biliary tract. The final case of obstructive jaundice occurred in a 68-yr-old woman with carcinoma in the papilla of Vater. Endoscopic cholangiography was found to be an effective technique for the diagnosis of obstructive jaundice when used in conjunction with angiography, percutaneous transhepatic cholangiography, and hypotonic duodenography. Endoscopic cholangiography is a relatively safe and simple diagnostic technique for obstructive jaundice, since a relatively clear graph can be obtained in a single, atraumatic examination.

6025 GLOBAL DILATATION OF THE BILE DUCTS AND LITHIASIS IN CHILDREN. (Fre.) Meck, J. M.; Rossier, A. (Hopital Saint-Vincent-de-Paul, 74, avenue Denfert-Rochereau, 75014 Paris, France). *Med. Chir. Dig.* 4(4):247-250; 1975.

The literature is reviewed and the case history of an 11.5-yr-old boy with primary intrahepatic lithiasis and extrahepatic lithiasis of the bile ducts is presented. Of interest was a complete absence of jaundice and no obstruction of the intra- and extrahepatic bile ducts, despite global dilation and calculi. The patient, as usually recommended, underwent a Y-shaped termino-terminal anastomosis of the common bile duct and jejunum. This technique allows for good drainage and avoids retention, which may be caused by a diverticulum forming at the site of the anastomosis. Peroperative cholangiography is important as it explores the permeability of the common bile duct as well as the branches of the intrahepatic bile ducts.

6026 ASCENDING CHOLEDOCHAL PAPILLOMATOSIS. (Ger.) Schmidt, H.-D.; Brunner, H. (Chirurgische Klinik der Universitat, D-6500 Mainz, Langenbeckstr. 1, W. Germany). *Munch. Med. Wochenschr.* 118(6):163-166; 1976.

The case of a 44-yr-old man with ascending choledochal papillomatosis is reported. The patient was hospitalized for congestive jaundice following cholecystectomy with choledocus reconstruction, and duodenotomy with papillar expansion and subsequent T-drainage. At reoperation, the gallbladder yielded about 50 ml of a gelatinous mucous material; a choledochoduodenostomy was established. Two yr later, epigastric pain recurred. Gastroduodenoscopy revealed an apparent bile thrombus and other unidentifiable structures. At laparotomy, the head of the pancreas was found to have undergone cystic degeneration, and a large, flat tumor was present in the common bile duct. A duodenopancreatectomy was performed. Upon histological examination, all of the ducts, large and small, were seen to be filled with papillomas. Recovery proceeded smoothly; the elevated alkaline phosphatase levels normalized rapidly. Slight ascending cholangitis was apparent on follow-up 1 yr later. Ascending papillomatosis of the common bile duct should be regarded clinically as a malignant condition, since intrahepatic growth is inevitable. Radical surgery is the therapy of choice, but is not always possible. Removal of the diseased bile duct and duodenopancreatectomy may be performed as two separate procedures, if the patient's condition demands this and if malignant degeneration of the tumor has not occurred.

6027 PRIMARY SCLEROSING CHOLANGITIS (RAMSEY DISEASE). (Ita.) Santagata. P.; Candela, F.; Masturzo, G. (Ospedali Rinuiti de Napoli, Ospedale "A. Cardarelli," Naples, Italy). *Rass. Int. Clin. Ter.* 55(16):1000-1007; 1975.

6028 CONTRIBUTION TO KNOWLEDGE OF GANGLION-BILIARY SYNDROME. (Ita.) Mayer, S.; Rossano. G. (Ospedali Riuniti di Napoli. Ospedale "A. Cardarelli," Naples, Italy). *Rass. Int. Clin. Ter.* 55(16):975-985; 1975.

6029 EPIDEMIOLOGIC ASPECTS OF GALLBLADDER DISEASE IN CHILE. (Spa.) Medina, E.; Kaempffer, A. M.; Irarrazaval, M.; de Croizet, V.

A.; Toporowicz, M. (Departamento de Salud Publica y Medicina Social, Sede Santiago Norte, Universidad de Chile, Santiago, Chile). *Bol. Afic. Sanit. Panam.* 80(3):220-228; 1975.

6030 ISOLATED OR PREDOMINANT RUPTURE OF THE INTRAHEPATIC BILE DUCTS. (Fre.) Campion, J. P.: Launois, B.; Roumane, H.; Le Calve, J. L. (C.H.U., Hopital Pontchaillou, 3500 Rennes, France). *Ann. Chir.* 30(3):211-213; 1976.

6031 THE MOTOR ACTIVITY OF THE DUODENUM IN PATIENTS WITH CHRONIC CALCULOUS CHOLECYSTITIS. (Rus.) Savinov, I. P.; Danilov, L. N. (I. P. Pavlov First Leningrad Medical Inst., Leningrad, USSR). *Vestn. Khir.* 115(11):33-35; 1975.

6032 IS CHOLEDOCHODUODENOSTOMY STILL LEGITIMATE FOR GALLSTONES? THE POSSIBLE CURRENT INDICATIONS. (Ita.) Campana, F. P.; Redler, A.; de Antoni, E.; Aiello, L. M. (I Patologia Speciale Chirurgica, Universita degli Studi, Rome, Italy). *Chir. Gastroenterol.* 9(1):73-82; 1975.

6033 DIAGNOSIS AND TREATMENT OF CHRONIC CHOLECYSTITIS. (Rus.) Nogaller, A. M. (I. P. Pavlov Ryazan Medical Inst., Ryazan, USSR). *Ter. Arkh.* 48(3):129-138; 1976.

6034 HEMATOBILIA DUE TO PSEUDO-ANEURYSM OF THE LEFT HEPATIC ARTERY FOLLOWING CHOLECYSTECTOMY. (Fre.) Viard, H.; Cayot, M.; Verain, M.; Novou, A.; Weiller, M. (Hopital du Bocage, 21034 Dijon Cedex, France). *Lyon Chir.* 72(3):206-207; 1976.

6035 LITHIASIS OF THE BILE DUCTS: CLINICAL AND STATISTICAL CONSIDERATIONS CONCERNING 1,000 CASES. (Ita.) Rizzi, G. M.; Alozo, U.; Tenna, M. (Pio Istituto di D. Spirito ed OO. RR di Roma [Ospedale S. Eugenio], Rome, Italy). *Clin. Ter.* 76(6):563-566; 1976.

6036 EVALUATION OF THE LIVER FUNCTION, THE FUNCTION OF THE PANCREAS AND CONDITION OF BILIARY DUCTS IN PATIENTS AFTER SURGICAL TREATMENT OF CHOLELITHIASIS. (Pol.) Bielawski, W.; Jablonska-Kaszewska, I.; Adrich, A.; Chylinski, J.; Jackiewicz, Z. (Kliniki Instytutu Chorob Wewnetrznych AM, Gdansk, ul. Debniki 7, Poland). *Przegl. Lek.* 33(2):335-339; 1976.

6037 POST CHOLECYSTECTOMY PSEUDO-ANEURYSM. SPONTANEOUS REGRESSION FOLLOWED BY ANGIOGRAPHY. (Fre.) Wenger, J. J.; Morissette, J. J. (Hopital de l'Enfant-Jesus, 1401, 18 rue, Quebec, P. Q., Canada). *J. Chir. (Paris)* 109(5/6):643-648; 1975.

6038 REPARATIVE OPERATIONS OF BILE DUCTS. (Pol.) Krokowicz, A.; Dotka, J.; Wojtalik, A.; Grzegorzewicz, M. (II Klinika Chirurgii Ogolnej Instytutu AM, Poznan, Poland). *Pol. Przegl. Chir.* 47(9):1073-1076; 1975.

6039 FIRST EXPERIENCES WITH ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATICOGRAPHY (ERCP). (Ger.) Kroger, W.; Arendt, T.; Teichmann, W.; Leithauser, W. (Radiologische Klinik, Rontgendiagnostik, DDR-25 Rostock, E.-Heydemann-Str. 10, Germany). *Radiol. Diagn. (Berl.)* 16(3):315-324; 1975.

6040 ACUTE CHOLECYSTITIS: PATHOGENY AND EXPERIMENTAL STUDY. (Fre.) Delavierre, P.; Duran, M.; Vayre, P.; Roux, M. (Hopital de Vaugirard, 389, rue do Vaugirard, 75015, Paris, France). *Ann. Gastroenterol. Hepatol.* 11(3):197-207; 1975.

See also, 5497, 5535, 5545, 5557, 5563, 5564, 5565, 5566, 5567, 5569, 5572, 5577, 5718, 5833, 5842, 5849, 5859, 5901, 5902, 6002, 6072, 6079, 6084, 6109, 6112.

GENERAL

6041 THE GENESIS OF BOWEL SOUNDS: INFLUENCE OF VISCUS AND GASTROINTESTINAL CONTENT. (Eng.) Politzer, J.-P.; Devroede, G.; Vasseur, C.; Gerard, J.; Thibault, R. (Unite de Recherches Gastrointestinales et Department du Genie Electrique, Universite de Sherbrooke, Sherbrooke, Quebec, Canada). *Gastroenterology* 1(2):282-285; 1976.

A computer analysis of the influence of the stomach and small and large bowel on the genesis of bowel sounds was carried out. Eleven healthy volunteers were intubated p.o. with a multiple-lumen tube. Bowel sounds were recorded for 10 min when the tube was in the stomach, the upper jejunum, and the cecum, and while it was left intact *in situ*, or perfused with isotonic saline (15 ml/min), or with an equal mixture of isotonic saline and air (7.5 ml/min each). The effect of perfusion varied according to site; 46% of the sounds occurred while the tube was in the stomach, 32% in the jejunum, and 22% in the colon ($p<0.05$). There were two types of sounds. One type exceeded a preset threshold (S1) in amplitude, and was picked up by the computer. Its average absolute value for 20 msec remained inferior to nother preset threshold (S2). The number of sounds as stored in memory (NS--number of sounds having n amplitude exceeding S1/10 min). A second type f sound also exceeded S1, while its average absolute alue for 20 msec exceeded S2; this number of sounds NE--sounds having an amplitude exceeding S1, but aving also a 20-msec average amplitude above S2/10 in) was also stored. The latter group was composed f two types of sounds: some had a limited spectrum f low frequency (100 Hz) and were of high amplitude nd short (≈ 5 msec) duration (NE1); others had a igher and more dispersed frequency centered around 00 Hz (NE2). Fifty percent of high energy (NE) ounds appeared while the tube was in the stomach, 0% in the colon, and 20% in the jejunum ($p<0.005$). E1 were counted more often when the tube was in the olon (43%) than in the stomach (38%) or the jejunum 19%, $p<0.025$). In contrast, NE2 were present more ften when the tube was in the stomach (59%) than in he jejunum (24%) or the colon (17%, $p<0.005$). In he stomach and the colon, only the perfusion of the ir/saline mixture increased the number of sounds $p<0.025$), whereas the perfusion of saline increased he number of sounds ($p<0.025$) in the jejunum. The ir/saline mixture also increased the types of sounds eard in the stomach ($p<0.025$). It is concluded that he stomach is the most active site of production of owel sounds, followed by the colon and the small owel. The sounds differ in different sites, and the ype and number of sounds are influenced by viscus ontent.

6042 SERUM ANTIBODIES AND COPROANTIBODIES IN BACTERIAL INFECTIONS OF THE DIGESTIVE TRACT IN CHILDREN.

(Fre.) Laplane, R.; Begue, P.; Omanga, U. (Hopital Trousseau, 24, avenue du Docteur-Arnold-Netter, 75571 Paris Cedex 12, France). *Bull. Acad. Natl. Med. (Paris)* 159(7):596-600; 1975.

In order to study the immunological reaction to intestinal bacterial infections in children, fecal cultures were taken from 199 children (average age, 11.9 months), isolating 117 salmonellas, 90 enteropathogenic colibacilli, and 5 shigellas. Antigen extracted from the individual child's bacteria was used to measure serum antibody levels. Seroconversion occurred in 125/199 children, with a 65% rate of positive results for salmonella and 51% for *E. coli*; 99/125 of the positive children had digestive disorders. The rise in serum antibodies in half the healthy children suggests an asymptomatic subclinical illness. A comparative study of 65 children from Dakar (all with enterobacterial gastroenteritis) showed seroconversion in 79% of the latter, with 78% for salmonella and 86% for shigella. The percentage was highest in malnourished children, suggesting a hyperstimulation of the immunological system by bacterial and parasitic infections over a long period of time. Of 57 children (sampled from both groups) studied for fecal antibodies, 33 were found to be positive. In all 33 cases, the serum antibodies were positive, but in 9 seroconversion was delayed. There was no seroconversion in 21 of the remaining 24 without fecal antibodies. High rates of serum antibodies were constantly associated with an absence of fecal antibodies. It seems that the fecal antibodies appear early, before the serum antibodies, persist for a brief time, and disappear as the percentage of serum antibodies increases. This evolutionary pattern in turn suggests that the fecal antibodies have a local origin.

6043 HISTOCOMPATIBILITY ANTIGENS AND DERMATITIS HERPETIFORMIS WITH SPECIAL REFERENCE TO JEJUNAL ABNORMALITIES AND ACETYLATOR PHENOTYPE.

(Eng.) Reunala, T.; Salo, O. P.; Tiilikainen, A.; Mattila, M. J. (Univ. Central Hosp., Helsinki, Finland). *Br. J. Dermatol.* 94(2):139-143; 1976.

Studies were carried out in 61 patients with dermatitis herpetiformis in an effort to correlate the presence of various histocompatibility (HL-A) antigens with jejunal abnormalities and with the rate of acetylation of dapsone (4,4'-sulfonyldianiline). Among these patients, there was a significantly greater frequency of HL-A1 (64%) and of HL-A8 (87%) than in controls (17%, 55 controls had HL-A1 and 57 controls had HL-A8). HL-A1 was never detected in an HL-A8-negative subject. Of the 51 patients on whom jejunal biopsy was performed, 39 showed abnormal results; 35 of these patients had HL-A8. Of the 12 patients in whom the jejunal biopsy was normal, HL-A8 was present in 10, indicating that its frequency did not differ significantly in patients with normal and abnormal biopsies. There was no significant difference in the occurrence of various HL-A antigens when compared with the rate of acetylation. The incidence of HL-A8 among patients with dermatitis herpetiformis is higher than that reported earlier for such patients, and is similar to that reported for patients with adult celiac disease. The increased incidence of HL-A1 was atrributed to the increased frequency of the haplotype HL-A1, 8.

6044 GASTROINTESTINAL CHANGES IN HYPOGAMMAGLOBULINEMIA.

(Pol.) Horoszek-Maziarz, S.; Kryszewski, A.; Lehman-Borowska, J.; Rynkiewicz, H.; Bardzik, I.; Krupa-Wojciechowska, B. (I Clinic Internal Diseases, Inst. Internal Diseases Medical Acad., Gdansk, Poland). *Pol. Tyg. Lek.* 30(21):885-888; 1975.

Three cases of primary hypogammaglobulinemia are presented. Gammaglobulin levels were determined by paper electrophoresis, and the individual fractions of immunoglobulins were evaluated by immunoelectrophoresis. In all three cases, common symptoms were noted: the appearance of pneumonia several years before the full development of hypogammaglobulinemia; prolonged periods of diarrhea and symptoms of gastritis; poor absorption of vitamin B_{12} by the intestines; the absence of immunoglobulin A (IgA) and the absence or a decreased level of other IgG and IgM; and an increase in the bacterial population of the small intestine. All of the observed gastrointestinal disorders, as well as the infectious processes occurring during primary hypogammaglobulinemia, were attributed to the absence or decreased level of immunoglobulins, especially of IgA, which leads to structural and functional damage of the gastrointestinal tract and to damage of the entire immunological defense mechanism of the body.

6045 PEUTZ-JEGHERS SYNDROME. (Pol.) Bober-Dumanska, J. (V Clinic, Dept. Internal Diseases, Inst. Undergraduate Study, WAM, Warsaw, Poland). *Wiad. Lek.* 28(8):685-689; 1975.

The case of a 51-yr-old man with the Peutz-Jeghers syndrome coexisting with penile carcinoma is described. The patient presented with abdominal pain, lack of appetite, and an elevated temperature. During a 13-yr period, he had been hospitalized several times with polyps of the large intestine, attributed to the Peutz-Jeghers syndrome. Six years previously, he had been hospitalized for removal of a penile node, which was histologically described as planoepithelial carcinoma. At hospitalization, the patient showed signs of a somewhat enlarged liver and the beginning of inflammation of the gallbladder and possibly of the biliary ducts. Numerous polyps of various sizes were seen in the colon and rectum. As a preventive measure, therapy with 5-fluorouracil was begun, but was terminated after 1 month due to patient intolerance. Anemia and jaundice developed, and the elevated temperature persisted, despite treatment with antibiotics. Hematemesis and hematochezia developed. The patient died 82 days after hospitalization of massive hemorrhage from malignant gastric polyps. This case further confirms the precancerous nature of the Peutz-Jeghers syndrome.

6046 CELLULAR IMMUNOREACTIONS AGAINST COMMON ANTIGEN AND HUMAN LARGE OR SMALL INTESTINE ANTIGENS IN PATIENTS WITH REGIONAL ENTERITIS, ULCERATIVE COLITIS AND LIVER CIRRHOSIS. (Ger.) Eckhardt, R.; Heinisch, M.; Meyer zum Buschenfelde, K. H. (II Med. Klinik, Johannes-Gutenberg-Universitat, Mainz, W. Germany). *Z. Gastroenterol.* 13(3):413-417; 1975.

The leukocyte migration inhibition test (MIT) was used to examine cellular immunity in 27 patients with ulcerative colitis, 34 with Crohn's disease, 25 with cirrhosis, and 27 healthy controls. When tested against large intestine antigen, 96% of the patients with ulcerative colitis and 79% of the patients with cirrhosis displayed a migration index of less than 0.728, the lower limit of the 95% confidence interval for the control group. Only 19% of the patients with Crohn's disease fell below this value, while another 4 patients were in the borderline range. In the tests with small intestine antigen, migration indices below the lower limit of the 95% confidence interval for the controls (0.785) were found in 88% of the ulcerative colitis patients and 75% of those with cirrhosis. Only 32% of the patients with Crohn's disease fell below this value. In the tests with common antigen, 73% of the ulcerative colitis patients, 64% of the liver cirrhosis patients, and 21% of the Crohn's disease patients had migration indices below 0.6367, the lower limit of the 95% confidence interval for the controls. These findings may be used as an aid in differential diagnosis between ulcerative colitis and Crohn's disease, and they indicate that basically, only a weak immune tolerance exists toward intestinal antigens.

6047 GASTRIC FUNCTION IN CHRONIC RENAL FAILURE: EFFECTS OF MAINTENANCE HAEMODIALYSIS. (Eng.) McConnell, J. B.; Thjodleifsson, B.; Stewart, W. K.; Wormsley, K. G. (Dept. Medicine, Univ. Dundee, Dundee, Scotland). *Lancet* 2(7945):1121-1123; 1975.

Forty patients with chronic renal failure were studied to determine why some patients with azotemia have been reported to secrete abnormally large amount of acid and some to secrete very little. Fifteen patients were undergoing regular hemodialysis, while the remaining 25 patients were not. Ten nonhemodialysis patients had peak acid concentrations of less than 100 mM. The peak acid concentration values (range, 0-145 mM; median, 121 mM) of these patients were significantly less than the values of the hemodialysis patients (range, 109-148 mM; median, 128 mM). The peak acid outputs of the nonhemodialysis patients (range, 0-64.0 mmol/hr; median, 19.0 mmol/hr) were also significantly less than the outputs of the patients receiving hemodialysis (range, 10.7-54.6 mmol/hr; median, 37.0 mmol/hr). In four patients who had not previously been on hemodialysis, a significant increase in the mean peak acid concentration occurred within 5 months after the initiation of dialysis. The gastric secretory response to pentagastrin increased progressively during the course of hemodialysis, so that the 5- and 9-month values were significantly greater than before the start of hemodialysis. These studies show that many patients with chronic renal failure suffer from gastric mucosal hypofunction. Regular hemodialysis, by removing factors responsible for the gastric mucosal damage, permits manifestation of an underlying gastric hypersecretory state.

6048 DOSE-RESPONSE CURVES WITH METIAMIDE IN ZOLLINGER-ELLISON SYNDROME. (Fre.) Mignon, M.; Galmiche, J.-P.; Bonfils, S. (Hopital Bichat, 170, Boulevard Ney, F 75877 Paris Cedex 18). *Biol. Gastroenterol.* 8(3):239-244; 1975.

The interaction of metiamide (inhibitor of histamine-H_2 receptors) and pentagastrin on the acid and pepsin secretions of the stomach was studied in a 51-yr-old woman with Zollinger-Ellison's syndrome. Oral doses of metiamide (300, 600, or 1,200 mg) were administere on separate days, 1 hr before measuring the gastric reponse to increasing doses (0.25, 1.2, 5, and 12.5 μg/kg/hr) of pentagastrin administered by i.v. perfusion. Results were compared to the dose-respons curve of pentagastrin without metiamide. Metiamide reduced basal gastric acid and pepsin secretions; the effect was dose-dependent. The kinetic characteristics of the inhibition suggest a competitive metiamide-pentagastrin interaction for acid secretion and a noncompetitive interaction for pepsin secretion

6049 THERAPEUTIC ANGIOGRAPHY. (Ger.) Bucheler, E. (Radiologische Klinik, Martinistrasse 52, 2000 Hamburg 20, W. Germany). *Z. Gastroenterol.* 14:187-192; 1976.

6050 "SURGICAL" LAPAROSCOPY. INDICATIONS AND VALUE. (Ger.) Pannen, F.; Frangenheim, H. (Gynakologische Abteilung, Stadtischen Krankenanstalten, D-775 Konstanz, W. Germany). *Chirurg* 46(9):405-410; 1975.

6051 PRESSURES, BLOOD GASES, pH, LACTATE AND PYRUVATE CONCENTRATIONS IN THE PORTAL VENOUS BLOOD IN PATIENTS THE FIRST 9 DAYS AFTER LAPAROTOMY. (Ger.) Eisele, R.; Dissmann, W.; Nasseri, M.; Thimme, W. (Chirurgische Klinik und Poliklinik im Klinikum Westend, D-1000 Berlin 19, W. Germany). *Res. Exp. Med. (Berl.)* 166(2):131-145; 1975.

6052 COMPLICATIONS OF VAGOTOMY DURING THE OPERATION AND IN THE EARLY POSTOPERATIVE PERIOD. (Ger.) Ihasz, M.; Refi, M.; Kiss, L. (Semmelweis Medical Univ., 1088 Budapest, VIII, Baross u. 23-25, Hungary). *Langenbecks Arch. Chir.* 341(2):127-134; 1976.

6053 GENERAL INDICATIONS OF INTRAVENOUS HYPERALIMENTATION IN ADULTS AND ITS PROBLEMS. (Dut.) Pimontel, P. (Laboratorium voor experimentele Heelkunde, Universitaire Instelling Antwerpen, Universiteitsplein 1, 2610 Wilrijk, Netherlands). *Tijdschr. Gastroenterol.* 18(4):215-239; 1975.

6054 POSSIBILITIES AND NECESSITIES OF PARENTERAL NUTRITION WITH AMINO ACID MIXTURES. (Ger.) Ducluzeau, R.; Raibaud, P. (Laboratoire d'Ecologie Microbienne, I.N.R.A.-C.N.R.Z., 78 Jouy-en-Josas, Paris, France). *Z. Ernaebrungswiss.* 14(2):133-144; 1975.

6055 THE EFFECT OF VOLTAREN ON THE GASTROINTESTINAL EXCRETION OF BLOOD. (Ger.) Uthgenannt, H.; Timm, H. (Med. Hochschule, D-2400 Lubeck, Kronsdorfer Allee 71/73, Germany). *Munch. Med. Wochenschr.* 117(50):1987-1990; 1975.

6056 INTESTINAL ABSORPTION IN ELDERLY WOMEN. (Pol.) Jasinska-Zubelewicz, E. J.; Kirschner, H. (Instytut Medycyny Spolecznej AM, 02-007 Warsaw, ul. Oczki 3, Poland). *Pol. Tyg. Lek.* 31(22):921-923; 1976.

6057 INTESTINAL ABSORPTION OF ^{47}Ca IN SOME METABOLIC DISEASES. (Cro.) Odavic, M.; Ivkovic, L.; Micic, R.; Antic, M. (Klinika za Unutrasnje Bolesti, Vojnomedicinska Akademija, Yugoslavia). *Zbornik Vojnomed. Akad.* 77-81; 1973.

6058 AUTOANTIBODY FORMATION AND CELLULAR IMMUNE REACTIONS TO HEPATIC ANTIGENS. (Ger.) Intorp, H. W.; Terlunen, H.; Gruber, H.; Bassewitz, D. B.; Husen, N. van. (Med. Univ.-Poliklinik, 44 Munster, Westring 3, W. Germany). *Med. Welt* 26(37):1637-1639; 1975.

6059 GASTROINTESTINAL HORMONES. (Ger.) Demling, L. (Med. Univ.-Klinik, Krankenhausstrasse 12, D-8520 Erlangen/BR, W. Germany). *Z. Gastroenterol.* 14:68-69; 1976.

6060 NONALIMENTARY FUNCTIONS OF THE INTESTINAL HORMONAL SYSTEM (PHYSIOLOGICAL SIGNIFICANCE AND CLINICAL PROBLEMS). (Rus.) Ugolev, A. M.; Skrovtsova, N. B. (I. P. Pavlov Inst. Physiology, USSR Acad. Sciences, Leningrad, USSR). *Klin. Med. (Mosk.)* 54(3):15-22; 1976.

6061 SPASMOLYTIC EFFECT OF MEBEVERINE ON GASTROINTESTINAL MOTILITY. (Ita.) Bertaccini, G.; Impicciatore, M.; Molina, E.; Zappia, L. (Istituto di Farmacologia, Universita di Parma, Parma, Italy). *Farmaco (Sci.)* 30(10):823-836; 1975.

6062 ALTERATIONS OF BACTERIAL FLORA DURING CHEMOTHERAPY. (Ger.) Knothe, H. (Zentrum der Hygiene im Klinikum der Universitat, Paul-Ehrlich-Str. 40, D-6000 Frankfurt/M., W. Germany). *Munch. Med. Wochenschr.* 118(17):521-524; 1976.

6063 EVOLUTION OF FECAL MICROFLORA IN A "HETEROXENIC" INFANT MAINTAINED IN A PLASTIC ISOLATOR AND TRIAL ON DECONTAMINATION BY ANTIBIOTHERAPY. (Fre.) Raibaud, P.; Ducluzeau, R.; Muller, M. C.; Ghnassia, J. C.; Veron, M.; Griscelli, C. (Hopital des Enfants-Malades, 75730 Paris, Cedex 15, France). *Ann. Microbiol. (Paris)* 126(3):357-366; 1975.

6064 PRESENT ANATOMICOPATHOLOGIC DISMEMBERMENT OF CARCINOIDS. (Fre.) Berger, G. (Hopital Cardiovasculaire, BP Lyon Montchat, 69394, Lyon Cedex 3, France). *Rev. Medecine* 16(30): 2077-2086; 1975.

6065 IATROGENIC DISEASES OF THE GASTROINTESTINAL TRACT. (Fre.) Dupuy, R.; Thiroloix, J. (Centre de Gastro-Enterologie, 100, Bd du General Leclerc, 92110 Clichy, France). *Sem. Hop. Paris Ther.* 52(2):85-91; 1976.

6066 ZINC THERAPY FOR ACRODERMATITIS ENTEROPATHICA. (Ger.) Thyresson, N. (Dept. Dermatology, Karolinska sjukhuset, S-10401 Stockholm 60, Sweden). *Hautarzt* 26(8):408-410; 1975.

6067 ZINC TREATMENT AS A THERAPY OF CHOICE FOR ACRODERMATITIS ENTEROPATHICA. (Ger.) Reich, H.; Opitz, K. (Universitats-Augenklinik, v.-Esmarch-Strasse 56, D-44 Munster, W. Germany). *Med. Klin.* 71(1):1-6; 1976.

6068 ACRODERMATITIS ENTEROPATHICA—ZINC AS A LIFE-SAVING DRUG. (Ger.) Reich, H. (Universitats-Hautklinik, v.-Esmarch-Strasse 56, D-4400 Munster/Westf., W. Germany). *Hautarzt* 27(3): 95-100; 1976.

6069 DEMONSTRATION OF MASSIVE ENDOGENOUS POTASSIUM LOSS IN THE COURSE OF ENTEROPATHY by ^{42}K TEST. (Fre.) Vesin, P.; Litwin, I.; Gamerman, H.; Milhaud, G. (Nouvel Hopital, F 94190 Villeneuve-Saint-Georges, France). *Arch. Fr. Mal. Appar. Dig.* 64(8):708; 1975.

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See also, 5422, 5526, 5552, 5573, 5610, 5612, 5714, 5810, 5880, 5956, 5960, 6113, 6116, 6126.

GENERAL

Parasitology

6099 INTESTINAL BILHARZIASIS IN GUADELOUPE. (Fre.) Tribouley, J.; Tribouley-Duret, J.; Bernard, D.; Appriou, M.; Pautrizel, R. (Laboratoire d'Immunologie et de Biologie parasitaire, Universite de Bordeaux II, 33-Bordeaux, France). *Bull. Soc. Pathol. Exot.* 68(2):180-193; 1975.

Endemic intestinal bilharziasis in Guadeloupe was studied by testing sera from 8,500 persons for the presence of antibodies to *Schistosoma mansoni*. Antigen was prepared from a stock of *S. mansoni* originating in Puerto Rico, and was maintained in the laboratory in either mouse or hamster hosts. The parasites were crushed in a mortar and treated successively with ethanol at -20 C and ether anhydride. After centrifugation, the precipitate was dried, and the last traces of ether were eliminated. The powder was resuspended and adjusted for pH; a supernatant from a final centrifugation constituted the antigenic solution. The serum antibody-antigen reaction was carried out in the presence of guinea pig complement using an automated microtechnique. The immunologic method used in this study was a sensitive indicator of endemic levels, since an average of 35% of the population had positive sera, compared to the 8% reported by parasitological methods. Percentages of positive sera in different regions varied from 13 to 78%, which may be explained by population density and proximity and by the use of infested rivers. The age group with the highest endemic level was 30-40 yr, with 65% demonstrating positive sera. Sera was positive in less than 30% of the 0-10 yr age group, and percentages tended to diminish in the population over 40 yr. The diminution of positive responses may be a result of a change in the immunological response of the individual to an antigenic stimulus of prolonged duration.

6100 THE INTENSITY AND EFFECTS OF INFECTION WITH Schistosoma mansoni IN A RURAL COMMUNITY IN NORTHEAST BRAZIL. (Eng.) Lehman, J. S.; Mott, K. E.; Morrow, R. H., Jr.; Muniz, T. M.; Boyer, M. H. (Edna McConnell Clark Foundation, 250 Park Ave., New York, NY 10017). *Am. J. Trop. Med. Hyg.* 25(2):285-294; 1976.

The intensity of infection with *Schistosoma mansoni* and its effects were investigated in a defined population living in three contiguous subcounties in a nonmalarious area of northeastern Brazil. Quantitative stool egg counts were performed on 363 of the 417 inhabitants; physical examinations were performed on 294 of the 357 individuals over 5 yr of age. The maximum increase in incidence was observed between the 1-4 yr (36%) and 5-9 yr (72.6%) age groups, and the maximum increase in the fecal egg count occurred between 5-9 yr (132 eggs/ml) and 10-14 yr (301 eggs/ml) age groups. By age 20, almost everyone was infected. Relatively high geometric mean egg counts (>100 eggs/ml) were found in persons from under age 5 to about 34 yr. In the subcounty with the lowest quantitative egg counts, the age-specific prevalence rates increased more slowly than in the subcounties with higher egg counts. Nearly 50% of the total fecal egg output was accounted for by 22 individuals, with a mean age of 12.6 yr; egg counts were all over 800 eggs/ml of stool, with a mean of 1,514 eggs/ml. In children aged 10-14 yr, 85.4% had hepatomegaly; in all other age groups, the percentage ranged from 60.4 to 66.7%. In children aged 5-9 yr, 7.5% had splenomegaly, while the percentage ranged between 15.4 and 20.8% in the other age groups. The degree of hepatomegaly was directly correlated with increasing egg counts ($p<0.01$). This was not true for adults, nor was there an overall difference between infected and noninfected adults with respect to liver and spleen enlargement ($p>0.1$). In children, neither the presence of infection with *S. mansoni* nor its intensity was reflected by altered anthropometric measurements. The results support the argument for identification and selective and preventive chemotherapy of children with high egg counts.

6101 SOME EPIDEMIOLOGICAL FACTORS THAT FAVOR INTESTINAL PARASITIC INFECTIONS IN CHILE. (Spa.) Ramirez, R. (Departamento de Microbiologia y Parasitologia, Universidad de Chile, Casilla 9183, Santiago, Chile). *Bol. Chil. Parasitol.* 30(3/4): 80-82; 1975.

6102 IRRITABLE COLON AND PROTOZOAL INFECTION. (Ger.) Flentje, B.; Wirth, J. (Bezirkshygiene-Institut, 1055 Berlin, Schneeglockchenstr. 26, E. Germany). *Dtsch. Gesundheitswes.* 31(26):1219-1221; 1976.

6103 USE OF PROTEOLYTIC ENZYMES IN CASE OF SUPPURATION OF RESIDUAL HEPATIC CAVITIES FOLLOWING ECHINOCOCCOTOMY. (Rus.) Saidov, G. S.; Rybakova, L. S. (Bukhara Oblast Hosp. No. 1, Bukhara, USSR). *Khirurgiia (Mosk.)* (10):142-143; 1975.

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6106 GRANULOMATOUS HEPATITIS CAUSED BY EGGS OF ASCARIS. (Eng.) Fagundes Neto, U.; Patricio, F. R. S.; Carvalho, A. de (Paulista Medical School, Rua Napoleao de Barros, 715, Sao Paulo, Brazil). *Acta Gastroenterol. Latinoam.* 6(4):165-168; 1974.

6107 TREATMENT OF HUMAN INTESTINAL HELMINTHIASIS WITH A COMBINED DOSAGE OF MEBENDAZOLE AND THIABENDAZOLE. (Spa.) Schenone, H.; Galdames, M.; Cabello, C. (Departamento de Microbiologia y Parasitologia, Universidad de Chile, Casilla 9183, Santiago, Chile). *Bol. Chil. Parasitol.* 30(3/4): 89-90; 1975.

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6110 Hymenolepis nana VAR. fraterna (CESTODA: HYMENOLEPIDIDAE) IN Leucophaea maderae (DICTYOPTERA: BLATTIDAE): CROSSING OF THE GUT WALL. (Fre.) Pesson, B.; Leger, N. (Laboratoire de Parasitologie, Faculte de Pharmacie de Paris V, 4, avenue de l'Observatoire, F 75006 Paris, France). *Ann. Parasitol. (Paris)* 50(4):425-437; 1975.

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6112 ERRORS IN THE DIAGNOSIS AND TREATMENT OF CHOLELITHIASIS IN PATIENTS WITH OPISTHORCHOSIS. (Rus.) Kirilenko, M. P.; Khokhrin, A. N.; Molov, I. S. (Tyumen Oblast Clinical Hosp., Tyumen, USSR). *Khirurgiia (Mosk.)* (10):125-128; 1975.

6113 LIVER SCHISTOSOMIASIS AND SARCOIDOSIS WITH LARGE SUBDIAPHRAGMATIC LYMPH NODES. (Fre.) Pieron, R.; Mafart, Y.; Lesobre, B.; Rolland, J.; Helenon, Ch.; Blanche, J.-M.; Lancastre, F.; Favre, M. (Hopital Tenon, 4, rue de la Chine, 75970 Paris Cedex 20, France). *Sem. Hop. Paris* 52(10):627-632; 1976.

6114 SCHISTOSOMIASIS AS A WORLDWIDE PROBLEM: PATHOLOGY. (Eng.) von Lichtenberg, F. (Peter Bent Brigham Hosp., Boston, MA 02115). *J. Toxicol. Environ. Health* 1(2):175-184; 1975.

6115 SCHISTOSOMIASIS OF THE LIVER, PORTAL HYPERTENSION AND BANTI'S SYNDROME. (Fre.) Dofing, J.-L. (Service de Gastro-enterologie, Hotel-Dieu, 86000 Poitiers, France). *Rev. Fr. Gastroenterol.* (115):33-34; 1976.

6116 STUDY OF HOST-PARASITE RELATIONS IN TRICHINOSIS BY INTESTINAL TRANSPLANTATION TECHNIQUE. (Fre.) Lancastre, F. (Laboratoire de Parasitologie, Faculte de Medecine, Paris, St. Antoine, France). *Wiad. Parazytol.* 21(4/5):737; 1975.

6117 COMPARISON OF THE THERAPEUTIC EFFICIENCY OF PYRANTEL PAMOATE AND MEBENDAZOLE IN ASCARIDIASIS, ANCYLOSTOMIASIS AND TRICHURIASIS ACCORDING TO THE McMASTER TECHNIQUE. (Por.) Camargo, P. A. M.; Diamante, R; de Almeida Basques, S.; Tonelli, E. (Fac. de Med. da UFMG, Minas Gerais, Brazil). *Pediatr. Prac.* 45(10/11/12):189-194; 1974.

See also, 5484, 5501, 5527.

GENERAL

Regional Enteritis

6118 CRITICAL STUDY OF THE EFFECTS OF ANTI-TUBERCULOSIS MEDICATION IN 18 PATIENTS WITH SEVERE FORMS OF CROHN'S DISEASE. (Fre.) Paris, J.; Paris, J. C.; Simon, V. (C.H.U., Lille, France). *Lille Med.* 20(4):333-338; 1975.

A series of 18 patients (10 men and 8 women, aged 16-47 yr) with severe Crohn's disease were treated with antitubercular drugs in combinations of three. Drugs used were: streptomycin, 1 g/day, i.m.; rifampicin, 600 mg/day, p.o.; ethambutol, 1,200 mg/day, p.o.; and isoniazide, 450 mg/day, p.o. Hepatitis attributed to the rifampicin developed in five patients. Three cases are reported in detail. There were no deaths and no amyloidosis or extradigestive lesions. Spread of disease to other intestinal segments was prevented as no ileocolitis developed in the four patients with ileitis. General state of health improved in 15 cases with weight gain in 16 and complete disappearance of functional symptoms in 11. X-ray studies demonstrated stabilization of disease in 3 patients, improvement in 10, and no evidence of disease in 3 patients treated for less than 6 months. Surgery was performed in three cases either because lesions persisted or complications arose (intestinal hemorrhage and ileocecal sclerosis). Treatment eradicated five disease-related and two surgery-related fistulas. The lesions of Crohn's disease and tuberculosis are histologically similar, which may explain the efficacy of the drugs studied.

6119 A CASE-CONTROL METHOD FOR SEEKING EVIDENCE OF CONTAGION IN CROHN'S DISEASE. (Eng.) Miller, D. S.; Keighley, A.; Smith, P. G.; Hughes, A. O.; Langman, M. J. S. (Medical Sch., Nottingham Univ., Nottingham, England). *Gastroenterology* 71(3): 385-387; 1976.

A case-control study was undertaken in 103 patients with Crohn's disease to ascertain whether this disease is contagious. All patients were diagnosed between 1958 and 1973. The addresses of all places of residence, schooling, and employment from 5 yr before the onset of symptoms until December 31, 1972 or death were determined. For each patient, two controls, matched by age (to within 1 yr), sex, and domicile to within ¼ mile, were selected. The application of the Pike and Smith case control technique for evaluating clustering of patients in time and space failed to reveal any significant clustering of patients indicative of contagion. Unless Crohn's disease is a rare response to a common infection, it appears that the disease is not contagious.

6120 AN ATTEMPTED EXPERIMENTAL REPRODUCTION OF THE HISTOGENESIS OF CROHN'S DISEASE. NOTE I: PRODUCTION OF A LASTING INTESTINAL LYMPHATIC BLOCK BY AN ORIGINAL TECHNIQUE. (Ita.) Pace, M.; Cardona, G.; Cataliotti, L.; Brugnola, D.; Pirillo, M.; Bandettini, L.; Nannelli, A. (Clinica II, Univ. di Firenze, Florence, Italy). *Acta Chir. Ital.* 30(4):455-469; 1974.

A new method of producing a lymphatic block in the small intestine was tested on 16 dogs; it consists of lymphangiofluoroscopic visualization of the lymphatic ducts and their multiple ligation at the level of the mesentery to achieve a complete and lasting block. Results show there are advantages compared to other methods (ligation, adenectomy, sclerosing injection, resection of the soft parts, and autograft). The numerous ligations make it possible to achieve a block lasting over a year. The method permits alterations of intestinal loops attributed to lymphostasis.

6121 AN ATTEMPTED EXPERIMENTAL REPRODUCTION OF THE HISTOGENESIS OF CROHN'S DISEASE. NOTE II: HISTOPATHOLOGICAL ASPECTS OF LASTING SEGMENTARY LYMPHATIC BLOCK OF THE ILEUM. (Ita.) Pace, M.; Cardona, G.; Cataliotti, L.; Brugnola, D.; Pirillo, M.; Nannelli, A.; Bandettini, L. (Clinica II, Univ. di Firenze, Florence, Italy) *Acta. Chir. Ital.* 30(4):471-489; 1974.

A lasting lymphatic block of the ileum was produced in 17 dogs by lymphangiofluoroscopic visualization of the lymphatic ducts and multiple ligation of the mesenteric lymphatic vessels. Anatomopathological results showed the direct effects of lymphostasis and other phenomena, such as ulcerations of the mucous membrane, segmentary stenoses, hyperplasia and increase in follicular aggregations, and polymorphic cellular infiltrations diffused under the mucous membrane. The findings confirm the importance of lymphostasis in the morphogenesis of Crohn's disease.

6122 ENDOSCOPIC RESULTS IN FIVE PATIENTS WITH CROHN'S DISEASE OF THE ESOPHAGUS. (Eng.) Huchzermeyer, H.; Paul, F.; Seifert, E.; Frohlich, H.; Rasmussen, Ch. W. (Medical Sch. Hannover, Hanover, W. Germany). *Endoscopy* 8(2):75-81; 1976.

The endoscopic and radiographic appearances of the esophagus in Crohn's disease were studied in five cases. Two stages of the disease were differentiated: a nonstenosed phase predominated by inflammation and a phase of increasing stenosis with a predominant symptom of dysphagia. The morphological changes were mainly in the middle and lower parts of the esophagus. In one of the two patients in stage 1, endoscopy showed erosions and granulomatous changes in the lower esophagus. X-ray showed an irregularity of the esophageal wall. In the second patient, endoscopy showed flat ulcerations, erosions, and granulomatous and polypoid changes over the entire esophagus. A cobblestone picture in the middle and lower esophagus was seen by x-ray. In the first of the three patients with stage 2 disease, endoscopy showed stenosis 29 cm from the incisors, with narrowing to pencil thickness. Proximal to this, the mucosa was hyperemic, with a white fibrin and mucous covering, which was vulnerable to the touch. X-ray showed tubular stenosis with an irregular contour, as it did in the two remaining cases. In the second of these, endoscopy revealed a tumor-like process 35 cm below the tooth line. In the last case, endoscopy showed a thread-like stenosis 34 cm from the incisors. Proximal to it, the mucosa showed shallow ulcers covered with fibrin. Neither endoscopy, radiology, nor guided biopsy was sufficient to diagnose Crohn's disease. Exact diagnosis was possible only by histological examination of a resected specimen.

6123 CALCIUM ABSORPTION IN CROHN'S DISEASE. (Eng.) Krawitt, E. L.; Beeken, W. L.; Janney, C. D. (Dept. Medicine, Univ. Vermont, Burlington, VT). *Gastroenterology* 71(2):251-254; 1976.

Calcium balance, endogenous loss of calcium, and intestinal absorption were measured in 31 patients with Crohn's disease, using a simultaneous metabolic balance and calcium isotope regimen. Calcium malabsorption resulting in negative calcium balance was found in only four patients. No elevation of endogenous fecal calcium or total secreted intestinal calcium was observed in 10 patients, regardless of the level of net or true calcium absorption. A nonlinear correlation between calcium balance and serum protein loss was observed, but no association with intestinal fat excretion, *d*-xylose absorption, bacterial colonization of the jejunum, or glucocorticosteroid therapy was noted. The results indicate that in this group of patients, calcium malabsorption occurred infrequently, and that the levels of calcium excretion correlated best with enteric protein loss.

6124 CONTRIBUTION TO THE COINCIDENTAL OCCURRENCE OF REGIONAL GRANULOMATOUS ENTERITIS AND IDIOPATHIC RECTOCOLITIS. (Rus.) Vrubel, F.; Martinek, K. (First Surgical Clinic, J. E. Purkinje Univ., Brno, Czechoslovakia). *Scr. Med. (Brno)* 48(6/7):531-536; 1975.

6125 CLINICAL COURSE, DIAGNOSIS AND TREATMENT OF COMPLICATED FORMS OF CROHN'S DISEASE. (Rus.) Fedorov, V. D.; Pokrovsky, G. A.; Levitan, M. Kh.; Dzhambeev, V. L.; Strekalovsky, V. P.

(Scientific Inst. and Lab. Proctology with Clinic, Moscow, USSR). *Khirurgiia (Mosk.)* (3):3-8; 1976.

6126 CROHN'S DISEASE OF THE ILEUM AND TUBERCULOSIS. (Pol.) Bartnik, W.; Butruk, E.; Krynski, J. (Klinika Gastroenterologii i Przemiany Materii C.M.K.P., ul. Goszczynskiego 1, 02-616 Warsaw, Poland). *Pol. Arch. Med. Wewn.* 55(1):71-78; 1976.

6127 CROHN'S DISEASE AFTER ADMINISTRATION OF ORAL CONTRACEPTIVES. REPORT OF A CASE. (Fre.) Bourdais, J.-P.; Delavierre, P.; Vayre P.; Hureau, J.; Letailleur, M. (Hopital de Vaugirard, 389, rue de Vaugirard, F 75015 Paris, France). *Arch. Fr. Mal. App. Dig.* 65(2):155-160; 1976.

6128 CROHN'S DISEASE. (Fre.) Gueroult, N. (Hopital Broussais, 75014 Paris, France). *Rev. Med.* 16(35):2385-2392; 1975.

See also, 5818, 5819, 5821, 6046.

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED_{50}	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

6129 HISTOCHEMICAL CHANGES INDUCED BY TRUNCAL VAGOTOMY IN DIFFERENT SEGMENTS OF THE DIGESTIVE TRACT. (Ger.) Ihasz, M.; Ungvary, Gy.; Koiss, I.; Hudak, A. (II. Chirurgische Klinik, Medizinische Universitat Semmelweis, Budapest, Hungary). *Z. Exp. Chir.* 7(5):273-289; 1974.

Histochemical changes in various segments of the gastrointestinal tract after truncal vagotomy were studied in dogs. The animals received midline laparotomies; the anterior and posterior vagus branches were mobilized subdiaphragmatically, and 2-3 cm of nerve was resected. Completeness of the vagotomy was confirmed histologically. At various postvagotomy times, gastric, duodenal, jejunal, ileal, and colon sections were prepared. Alkaline phosphatase (AKP) increased negligibly in most gastric sections, mainly in the intermediate space between the glandular fundus and the lamina muscularis mucosae; epithelial glandular cells were negative. Acid phosphatase (ACP) increased in the glandular cells, which were normalized in 2 weeks. Succinodehydrogenase (SDH) was initially reduced, but normalized in 6 months. In the duodenum, AKP initially increased, then decreased while ACP initially decreased, then increased, both by week 4. SDH rose after week 4. In the jejunum, there was no AKP change in the tunica mucosa until a decrease at week 4. There was also a decline in the cuticles of villous epithelium and a 50% increase in the glandular epithelium of the Lieberkuhn's crypts during week 1. Nonspecific esterase (NSE) did not change, but SDH decreased from day 2 to week 4. ACP increased by day 2-3, then decreased through week 4. In the ileum, both AKP and ACP initially increased, then decreased, while NSE failed to change, and SDH declined. AKP remained unchanged in the colon up to day 10, then decreased; ACP initially increased, then declined, and SDH did not change. Truncal vagotomy probably does not elicit histochemical changes in the gastrointestinal tract, which could explain postvagotomy problems.

6130 EFFECT OF HYPOXIA ON RETICULAR FIBERS IN RAT LIVER. (Ger.) Baranova, M.; Meitner, E. R.; Trskova-Boselova, L. (Medical Faculty, Comenius Univ., Martin, Czechoslovakia). *Anat. Anz.* 137:503-511; 1975.

Based on accumulating evidence that oxygen deficit is a stimulus to connective tissue formation, the effect of hypoxia on the reticular fiber (RF) framework in 12 pregnant Wistar rats was examined. The animals were exposed to 60-min hypoxic intervals daily for 21 days, and maternal and neonatal liver probes were analyzed. In adults, the RF between the liver plates and along the bile ducts and peripheral vascularization was enlarged and thickened. Long strands penetrated into the parenchyma, extending in a continuous sheet between vessels. Shorter stretches of RF appeared in large coil formations between the plates, usually around hemina. Evidence of inflammation and the presence of fibroblasts were never seen. In newborns, a picture similar to hypoxic adults was found, with bizarre formations of thickened fibers. Unlike the adult or control neonates, the parenchyma was little differentiated, a stigma which was more extensive, and probably more critical, than the RF plethora. The morphological findings are interpreted as an initial stage of the changes of hepatic connective tissue, which lead to fibrosis after prolonged and nonintermittent hypoxia.

6131 EFFECTS OF ANTRECTOMY ON ULTRASTRUCTURE OF RAT PARIETAL CELLS [Abstract]. (Eng.) Helander, H. F. (Dept. Anatomy, Univ. Umea, Sweden). *Scand. J. Gastroenterol.* 10(34):19-20; 1975.

6132 MORPHOLOGICAL AND FUNCTIONAL SIMILARITIES OF THE CANINE TERMINAL BILE AND PANCREATIC DUCTS [Abstract]. (Eng.) Tansy, M. F.; Salkin, L.; Innes, D. L.; Martin, J. S.; Kendall, F. M. (Temple Univ. Sch. Dentistry, Philadelphia, PA 19140). *Fed. Proc.* 35(3):393; 1976.

6133 LIGHT- AND ELECTRON-MICROSCOPIC STUDIES ON THE DEVELOPMENT OF PERIPORTAL BILE DUCTS OF HUMAN EMBRYOS [Abstract]. (Eng.) Enzan, H.; Ohkita, T.; Fujita, H.; Iijima, S. (Res. Inst. Nuclear Medicine, Hiroshima Univ., Japan). *Digestion* 12(4/6):301; 1975.

6134 HETEROGENEITY OF THE LIVER CELLS [Abstract]. (Eng.) Sweeney, G. D.; Sugai, M.; Jones, K. (Dept. Medicine, McMaster Univ., Hamilton, Ontario, Canada). *Clin. Res.* 23(5):611A; 1975.

6135 ULTRASONIC MEASUREMENTS OF THE RECTAL AND GASTRIC WALL THICKNESS [Abstract]. (Eng.) Rasmussen, S. N.; Riis, P.; Northeved, A.; Mollmann, K. M.; Hansen, L. K. (Gentofte Univ. Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 10(34): 25; 1975.

6136 LIPOLYTIC ACTIVITY OF WHOLE ISOLATED LIVER CELLS IN AQUEOUS SUSPENSION. (Eng.) Arnaud, J.; Boyer, J. (Hopital de la Conception, 13385 Marseille Cedex 4, France). *Biochim. Biophys. Acta* 424(3):460-468; 1976.

6137 ADRENERGIC CONTROLS IN THE S PHASE OF LIVER REGENERATION. (Eng.) Thrower, S.; Ord, M. G. (Dept. Biochemistry, Univ. Oxford, Oxford OX1 3QU, U. K.). *Biochem. Soc. Trans.* 3(5):724-726; 1975.

6138 HEPATIC FATTY ACID DEGRADATION DURING DEVELOPMENT OF THE RAT. (Eng.) Bailey, E.; Foster, P. C.; Shah, J. (Dept. Biochemistry, Univ. Sheffield, Sheffield S10 2NT, U. K.). *Biochem. Soc. Trans.* 4(2):230-231; 1976.

6139 STIMULATION OF HEPATIC BIOGENESIS OF STEROLS ON ADMINISTRATION OF ADENOSINE COMPOUNDS. (Eng.) Rao, G. S.; George, R.; Ramasarma, T. (Dept. Biochemistry, Indian Inst. Sci., Bangalore-560012, India). *Biochem. J.* 154(3):639-645; 1976.

6140 AN EXPERIMENTAL ANALYSIS OF LIVER DEVELOPMENT. (Eng.) Le Douarin, N. M. (Laboratoire D'Embryologie, Universite de Nantes, 38 Boulevard Michelet BP 1044, 44037 Nantes Cedex, France). *Med. Biol.* 53:427-455; 1975.

6141 STUDIES ON GASTRIC D CELL PATHOLOGY [Abstract]. (Eng.) Polak, J. M.; Bloom, S. R.; McCrossan, M.; Timson, C. M.; Arimura, A.; Pearse, A. G. E. (Depts. Histochemistry Medicine, RPMS, London, England). *Gut* 17(5):400-401; 1976.

See also, 6255, 6268, 6524, 6568, 6776.

ABSORPTION - EXCRETION - TRANSPORT

6142 MONOSACCHARIDE-DEPENDENT K^+-INFLUX ACROSS THE MICROVILLOUS MEMBRANE OF RAT JEJUNUM. (Ger.) Remke, H.; Luppa, D.; Muller, F. (Physiologisch-Chemisches Institut, Karl-Marx-Universitat, 701 Leipzig, E. Germany). *Acta Biol. Med. Ger.* 34(10):1567-1572; 1975.

Na^+ and K^+ influx across villous membranes were studied during the initial phase of monosaccharide (MS) transport. Paired comparisons of rat jejunum preparations, incubated with labeled ions, were related to steady state data. After incubation with Na^+-dependent sugars (D-galactose and methyl-α-D-glycoside), the K^+ influx fell. L-arabinose and L-sorbose, which are Na^+-independent, had no effect, but Na^+-dependent D-glucose and Na^+-independent D-fructose increased K^+ influx, because both MS are metabolizable. When the mucosal surface was exposed to the MS only during the time required for tracer measurement (maximum 50 sec), D-glucose behaved as a Na^+-dependent sugar, but D-fructose had no unambiguous effect on either ion. Since both ion influxes are not only affected by MS membrane transport (K^+ inhibition and Na^+ stimulation), but also by MS metabolism (K^+ stimulation and Na^+ inhibition), direct involvement of ($Na^+ + K^+$)-ATPase in MS transport across the membrane is inferred. An ATPase regulatory system had previously been demonstrated in the brush border. The hypothesis explains the changes in K^+ influx which the conventional gradient hypothesis omits.

6143 EFFECT OF CHOLESTASIS AND BILIARY DIVERSION ON THE ABSORPTION OF Na OCTANOATE IN THE RAT. (Eng.) Laurendeau, G.; Roy, C. C. (Hopital Sainte-Justine, Univ. Montreal, 3175 chemin Sainte-Catherine, Montreal H3T 1C5, Quebec, Canada). *Experientia* 32(1):75-77; 1976.

Having shown previously that the absorption of an actively transported substrate (3-*O*-methyl glucose) is increased following a 48-hr period of biliary diversion and impaired after a comparable period of cholestasis, the present study was carried out to determine if the absorption of octanoate, a passively transported molecule and the main constituent fatty acid of medium chain triglycerides, is similarly affected. Following the creation of a bile fistula, common bile duct ligation, or a sham-operation, male Sprague-Dawley rats received intraduodenally a mixture of 2% casein hydrolysate, 3% Na caseinate, and 13% dextrimaltose in an electrolyte solution containing 35 and 9 mEq/1 of Na and K, resp. After 48 hr, the absorption of Na octanoate was studied in 20-cm segments of proximal jejunum perfused *in vivo* with 11 mM Na octanoate, 3.6 µCi of Na octanoate-1-^{14}C, and 8.4 µCi of ^{3}H-labeled dextran. Although the mean rate of the disappearance of octanoate from the lumen of jejunal segments taken from the cholestatic animals (12.6 µM) and from the animals with bile duct diversion (13.2 µM) was lower than in controls (15.6 µM), this difference was not statistically significant. Although more Na was absorbed in bile fistula animals (313 µEq) than in the animals with bile duct ligation (163 µEq) or the controls (233 µEq), the difference with the bile-ligated rats was the only one to reach statistical significance ($p<0.01$). The ^{14}C radioactivity in portal plasma was usually over twice that found in aortic plasma, and accounted for approximately two-thirds of the counts absorbed over the 60-min experimental period. At the end of the perfusion, the ^{14}C uptake by jejunal segments represented less than 10% of the octanoate radioactivity that had disappeared from the lumen. No difference could be found between the three groups for tissue uptake and net portal transport. It is concluded that extrusion from the enterocytes and subsequent transport were unaffected by biliary diversion and by experimental cholestasis.

6144 THE RELATIONSHIP BETWEEN ANTRO-FUNDIC PERMEABILITY AND GASTRIC MUCOSAL BLOOD FLOW USING TRACER TECHNIQUES [Abstract]. (Eng.) Newman, B. M.; Taylor, T. V.; Elder, J. B.; Gillespie, I. E.

(Royal Infirmary, Manchester, England). *Gut* 16(10): 823; 1975.

6145 ROLE OF BILE IN MANGANESE ABSORPTION AND EXCRETION BY CALVES [Abstract]. (Eng.) Abrams, E.; Lassiter, J. W.; Neathery, M. W.; Miller, W. J.; Kincaid, R. L.; Hampton, D. L.; Gentry, R. P. (Univ. Georgia, Athens, GA 30602). *Fed. Proc.* 35(3):256; 1976.

6146 COPPER-BINDING PROTEIN AND COPPER ABSORPTION [Abstract]. (Eng.) Bronner, F.; Bossuk, C.; Golub, E. E. (Univ. Connecticut Health Center, Farmington, CT 06032). *Fed. Proc.* 35(3): 464; 1976.

6147 INHIBITION OF INTESTINAL IRON ABSORPTION BY LAUNDRY STARCH [Abstract]. (Eng.) Thomas, F. B.; Falko, J. M.; Zuckerman, K. (Dept. Medicine, Ohio State Univ., Columbus, OH). *Clin. Res.* 24(3):292A; 1976.

6148 TRANSEPITHELIAL TRANSPORT OF D-GALACTOSE IN RABBIT JEJUNUM [Abstract]. Sarracino, S. M.; Goldner, A. M. (Univ. California Medical Sch., Davis, CA 95616). *Fed. Proc.* 35(3):463; 1976.

6149 Na^+-DEPENDENT UPTAKE OF D-GLUCOSE BY MEMBRANE VESICLES FROM INTESTINAL BRUSH BORDERS [Abstract]. Beesley, R. C.; Faust, R. G. (Dept. Physiology, Univ. North Carolina, Chapel Hill, NC 27514). *Fed. Proc.* 35(3):464; 1976.

6150 INFLUENCE OF CHRONIC ALCOHOL INGESTION ON INTESTINAL PERMEABILITY TO MACROMOLECULES IN ADULT RATS [Abstract]. (Eng.) Worthington, B. S.; Syrotuck, J.; Meserole, L. (Univ. Washington, Seattle, WA 98195). *Fed. Proc.* 35(3):463; 1976.

6151 ALTERATIONS IN INTESTINAL TRANSPORT AND $(Na^+\text{-}K^+)$ATPase IN HYPOXIA [Abstract]. (Eng.) Lifshitz, F.; Pergolizzi, R.; Lipkin, A.; Teichberg, S. (North Shore Univ. Hosp., Manhasset, NY 11030). *Fed. Proc.* 35(3):464; 1976.

See also, 6258, 6532.

MOTILITY

6152 MATHEMATICAL MODELING OF THE COLORECTAL MYOELECTRICAL ACTIVITY IN HUMANS. (Eng.) Linkens, D. A.; Taylor, I.; Duthie, H. L. (Dept. Control Engineering, Univ. Sheffield, Sheffield, England). *IEEE Trans. Biomed. Eng.* 23(2):101-110; 1976.

Colonic myoelectrical activity was measured from the rectosigmoid in 66 human subjects, and three different mathematical models were constructed to simulate the myoelectrical patterns observed. Three basic patterns of behavior in colorectal myoelectrical activity were observed: a higher frequency rhythm (0.1-0.15 Hz), which was predominant throughout the rectum and lower sigmoid; a lower frequency rhythm (0.04-0.07 Hz); and periods of zero slow wave electrical activity. Linked relaxation oscillators were employed to simulate these myoelectrical patterns using three different mathematical models. In the three models, two of the activity patterns were obtained as stable limit cycle solutions produced by symmetrically coupling together two relaxation oscillators. The first model comprised a ring of interconnected oscillators, which produced a third stable solution representing the higher frequency of oscillation. Summation of adjacent oscillator outputs reproduced the zero activity when the oscillators were in antiphase. By the addition of an extra coefficient into the basic relaxation oscillator equation for the second model, the zero state of activity became a stable condition, and the three patterns of electrical activity were obtained without the necessity of a ring structure. The third model required a permanent parameter change to the basic Van der Pol equation to allow for the lower and higher frequencies to decay away to the zero activity condition. The two basic frequencies in colorectal myoelectrical activity that were measured can be reproduced by coupling together similar oscillators, rather than by postulating the existence of two separate types of cells having widely different intrinsic frequencies.

6153 ELECTRICAL OFF RESPONSE OF CAT ESOPHAGEAL SMOOTH MUSCLE: AN ANALOG SIMULATION. (Eng.) Chan, W. W.-L.; Diamant, N. E. (Toronto Western Hosp., Toronto, Ontario, Canada). *Am. J. Physiol.* 230(1):233-238; 1976.

The slow membrane depolarization, or "electrical off-response," that follows the electrical stimulation of cat circular esophageal smooth muscle was studied. Transverse strips of circular esophageal smooth muscle were obtained from 45 adult cats and were stimulated by trains of square-wave pulses (0.5-1 msec) delivered at a potential of 100 volts and a frequency of 10 cycles/sec. The pulsed current was administered by external platinum wire electrodes placed on either side of the muscle strips. The electrical off-response was preceded by a hyperpolarization of the muscle membrane, which was recorded during stimulation. The amplitude of the off-response depolarization increased directly with increasing amplitude of the preceding hyperpolarization. The membrane potential showed varying degrees of oscillation around the resting point, and the oscillation period was constant for a period (4-5 sec) that was double the time interval from the point of maximum hyperpolarization to the peak of the electrical off-response. These characteristics suggest that the electrical off-response could be represented by a linear second-order differential equation with variable damping. The application of this equation as an explanation for the observed bioelectrical events implies that the off-response depolarization is primarily a passive oscillation, as opposed to the active relaxation oscillations proposed to explain the electrical slow waves of the stomach, small intestine, and colonic smooth muscle. An analog simulation model based on this equation was constructed; and by varying the damping ratio and/or the natural frequency of the model, the characteristics of the electrical off-response of esophageal muscle were reproduced. The model provides a means of exploring the behavior of esophageal smooth muscle contractions under normal and pathological conditions.

6154 SMALL BOWEL MOTILITY: COMPARISON OF THE EFFECTS OF AN ANTICHOLINERGIC AGENT, THIS AGENT PLUS A TRANQUILIZER, AND A PLACEBO.

(Eng.) Rider, J. A. (Ralph K. Davies Medical Center, San Francisco, CA). *Curr. Ther. Res.* 20(2):142-148; 1976.

The effects of tridihexethyl chloride (TDC) either alone or in combination with meprobamate (MP) on the small bowel motility of normal adult men were measured by means of a miniature pressure transducer, swallowed, and positioned in the duodenum. After a 30-min pressure baseline was recorded, TDC (50 mg), either alone or in combination with MP (800 mg), was administered p.o. Within the 1st hr after administration intraluminal pressures fell below baseline and remained there over the entire 4-hr test period. Decreases were also observed after the administration of a placebo, but the pressure reductions after drug administration were significantly greater. Among nine subjects receiving TDC alone, the adjusted mean intraluminal small bowel pressure for the 4-hr period was 426 cm, representing 58% of baseline. This was in contrast to a value of 694 cm after placebo administration, which amounted to 74% of the baseline pressure. Among 10 subjects receiving the combination of TDC and MP, the mean intraluminal small bowel pressure for the same period was 2,202 cm, which represented 60% of the baseline pressure; the corresponding value after placebo administration was 3,147 cm, amounting to 81% of the baseline value. These results are consistent with previous findings showing that anticholinergic agents inhibit motility in patients with active duodenal ulcers.

6155 ACTION OF Sr ON THE TONUS OF PYLORIC ANTRUM STRIP FROM RAT'S STOMACH, PARTICULARLY, IN RELATION TO Ca.

(Eng.) Shino, H. (Kobe Univ. Sch. Medicine, Kobe, Japan). *Kobe J. Med. Sci.* 21(3):89-95; 1975.

The mechanism of action of Sr on the tonus of a strip of rat pyloric antrum was investigated in relation to the mobilization of Ca. The tissue was suspended in a bath solution to which drug solutions (calcium chloride, strontium chloride, potassium chloride, yohimbine hydrochloride, and propranolol hydrochloride) were added by dropping. Sr (4-8 mM) induced relaxation due to its membrane-stabilizing action in a normal solution, but initiated contraction in a high potassium (6 x 10^{-3} g/ml) depolarizing solution. In a calcium-bath solution, 2 mM of Sr released Ca from the membrane to elicit a contraction. This contraction gradually decreased, and finally disappeared with repeated applications of 4 mM Sr. Sr-induced contractions, due to the direct stimulation of contractile elements, remained constant in the high potassium (10^{-3} g/ml) depolarizing solution. Concentration-action curves of the contractions by exogenous Ca were prepared by the cumulative dose method. The log concentration-action curves of exogenous Ca in preparations in which the contraction by Sr had disappeared in the calcium-bath were shifted in parallel to the right by a low concentration (0.8 mM) of Sr, and were shifted to the right and downward by a higher concentration (8 mM) of Sr, corresponding to its competitive and noncompetitive antagonism, resp. In preparations in which the residual contraction by Sr (4 mM) had been obtained under high potassium depolarization in calcium-bath, Sr (0.8 mM and 8 mM) induced contractions and shifted the log concentration-action curve of exogenous Ca to correspond to the theory of competitive synergism between full agonist (Ca) and partial agonist (Sr). Since the direct stimulation of Sr to the contractile elements operates in this condition, the competitive synergism between Ca and Sr may occur in a reaction with troponin rather than in the membrane. This view is supported by the finding that 8 mM Sr did not exert noncompetitive inhibition against exogenous Ca in this condition, in striking contrast to the findings obtained in calcium-bath without high potassium depolarization.

6156 MOTOR AND BIOELECTRIC ACTIVITY OF CERTAIN SEGMENTS OF THE GASTROINTESTINAL TRACT OF DOGS DURING HEMORRHAGIC SHOCK.

(Ger.) Nikolov, N. A.; Dobrev, J.; Deleva, G. I.; Manolov, G. A. (Lehrstuhl fur Pathophysiologie, Medizinische Hochschule, 31 Sofia, Georgi-Sofijski-Str. 1, Bulgaria). *Zentralbl. Chir.* 100(24):1491-1497; 1975.

Small intestinal motility and bioelectric activity of stomach, duodenum, and upper jejunum were assayed in dogs in hemorrhagic shock. Small intestinal motility was reduced in 11/11 dogs at a blood pressure of 30 mm Hg. At 20 mm Hg, the tonic, rhythmic, and peristaltic motility was completely suppressed in 9/9 dogs. The bioelectric activity was also markedly reduced. At constant blood pressures under 40 mm Hg, both small intestinal motility and bioelectric activity were self-restored, with prominent spike potentials. Two hours after the onset of shock (blood pressure, 20 mm Hg), the intestinal loop was akinetic, and the bioelectric activity was strongly reduced. Blood reinfusion and 250 ml isotonic solution failed to normalize tonus, bioelectric activity, or blood pressure; small intestinal motility remained suppressed at least several days post-trauma. Hemorrhagic shock disturbed the rhythm of the slow gastric potential and depressed the amplitude of jejunal spike potential 80 min after the onset of bleeding. Two hours later, bioelectric activity was arrhythmic in the stomach and jejunum; by 3 hr, bioelectric activity was entirely absent, and the animals' condition was life-menacing. During this time, the mean femoral pressure was below 20 mm Hg.

6157 RELATIONSHIP BETWEEN INTRALUMINAL PRESSURE AND POTENTIAL DIFFERENCES. VARIATIONS IN THE PERFUSED RAT COLON [Abstract]. (Eng.) Gerard, J.; Devroede, G.; Postaire, J. G. (Dept. de Chirurgie, C.H.U., Sherbrooke, Quebec, Canada). *Clin. Res.* 23(5):621A; 1975.

6158 THE PRESSURE OF ESOPHAGEAL PERISTALSIS IN NORMAL HUMANS AS MEASURED BY DIRECT INTRA-ESOPHAGEAL TRANSDUCERS [Abstract]. (Eng.) Humphries, T. J.; Castell, D. O. (Naval Regional Medical Center, Philadelphia, PA). *Clin. Res.* 23(5): 578A; 1975.

6159 INTRACOLONIC PRESSURES DURING PERFUSION IN INTACT MAN [Abstract]. (Eng.) Devroede, G.; Chauve, A.; Bestin, E. (Centre Hospitalier Universitaire, Sherbrooke, P.Q., Canada). *Digestion* 13(3):166; 1975.

6160 AGE RELATED CHANGES IN DIMENSIONS, FORCE STRESS AND PRESSURE IN THE LOWER ESOPHAGEAL SPHINCTER [Abstract]. (Eng.) Biancani, P.; Behar, J.; Zabinski, M. P. (Yale Univ., New Haven, CT 06510). *Fed. Proc.* 35(3):304; 1976.

6161 STUDIES ON OPIATE EFFECTS IN THE TERMINAL COLON OF THE RAT [Abstract]. (Eng.) Huidobro-Toro, J. P.; Way, E. L. (Dept. Pharmacology, Univ. California, San Francisco, CA 94143). *Fed. Proc.* 35(3):265; 1976.

6162 VISCOELASTIC PROPERTIES OF THE RECTAL WALL AND ANAL SPHINCTER STRESS [Abstract]. (Eng.) Arhan, P.; Faverdin, C.; Persoz, B.; Devroede, G.; Dubois, F.; Pellerin, D. (Dept. de Physiologie, C.H.U. Necker, Paris, France). *Clin. Res.* 23(5):620A; 1975.

6163 DIFFERENTIAL COLONIC TRANSIT TIME AND THE RELATIONSHIP BETWEEN INTRALUMINAL PRESSURE AND TRANSIT IN THE COLON [Abstract]. (Eng.) Kirwan, W. O.; Smith, A. N. (Western General Hosp., Edinburgh, Scotland). *Gut* 16(10):825; 1975.

6164 MECHANICAL AND ELECTRICAL ACTIVITY OF PRIMATE ILEUM AND COLON [Abstract]. (Eng.) Schulte, W. J.; Woods, J. H.; Poulin, T.; Kraus, M.; Condon, R. E. (Wood Veterans Admin. Center, Milwaukee, WI 53193). *Fed. Proc.* 35(3):303; 1976.

6165 SPONTANEOUS ELECTRICAL ACTIVITY OF CANINE ANTRAL SMOOTH MUSCLE AND ITS MODULATION BY NEUROTRANSMITTERS [Abstract]. (Eng.) Szurszewski, J. H.; El-Sharkawy, T. Y. (Mayo Clinic and Foundation, Rochester, MN 55901). *Fed. Proc.* 35(3):303; 1976.

6166 INDIRECT STIMULATORY EFFECTS OF HEROIN ON DOG INTESTINE [Abstract]. (Eng.) Grubb, M. N.; Burks, T. F. (Univ. Texas Medical Sch., Houston, TX 77025). *Fed. Proc.* 35(3):265; 1976.

See also, 6331, 6387, 6388, 6389, 6520, 6523.

SECRETION AND METABOLISM

6167 INTERACTIONS BETWEEN Ca^{2+} AND CYCLIC NUCLEOTIDES AS COUPLING AGENTS IN SECRETION [Abstract]. (Eng.) Rasmussen, H. (No affiliation given). *Digestion* 13(1/2):121; 1975.

6168 A COMPARISON OF APPARENT DIGESTIBILITY VALUES FOR NUTRIENTS FROM MEASUREMENTS IN THE ILEUM AND FAECES OF GROWING PIGS [Abstract]. (Eng.) Braude, R.; Low, A. G.; Partridge, I. G.; Sambrook, I. E. (Natl. Inst. Res. in Dairying, Shinfield, Reading RG2 9AT, England). *Pre. Nutr. Soc.* 34(2):46A-47A; 1975.

6169 INHIBITION OF GLUCOSAMINE SYNTHETASE BY ULCEROGENIC AND NON-ULCEROGENIC DRUGS [Abstract]. (Eng.) Goodman, K. M. J.; Kent, P.

W.; Truelove, S. C. (Radcliffe Infirmary, Oxford, England). *Gut* 16(10):823; 1975.

6170 CHOLINERGIC REGULATION OF GLYCOGENOLYSIS AND PROTEIN SECRETION IN RAT SALIVARY GLANDS [Abstract]. (Eng.) Rossignol, B.; Herman, G.; Keryer, G.; Chambaut-Guerin, A. M.; Ovtracht, L.; Busson, S. (Institut de Biochimie, Univ. de Paris-Sud, Orsay, France). *Digestion* 13(1/2):122; 1975.

6171 RADIOIMMUNOASSAY MEASUREMENT OF DISAPPEARANCE HALF-TIME OF SECRETIN [Abstract]. (Eng.) Rayford, P. L.; Curtis, P.; Fender, H. R.; Thompson, J. C. (Dept. Surgery, Univ. Texas Medical Branch, Galveston, TX). *Surg. Forum* 26:385-386; 1975.

See also, 6502, 6519.

SECRETION AND METABOLISM

Stomach

6172 MEASUREMENT OF GASTRIC FUNCTIONS DURING DIGESTION OF ORDINARY SOLID MEALS IN MAN. (Eng.) Malagelada, J.-R.; Longstreth, G. F.; Summerskill, W. H. J.; Go, V. L. W. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 70(2):203-210; 1976.

A method for measuring gastric secretions and emptying rates during the digestion of ordinary (solid-liquid) meals in man is described. The technique quantifies movements of volume across the pylorus, using constant duodenal perfusion with a nonabsorbable marker, polyethylene glycol (PEG, 5 g/l), which in turn quantifies emptying into the duodenum of ^{14}carbon-labeled PEG (30 μCi). In practice, the subject swallows a single-lumen gastric tube and a triple-lumen duodenal tube; the former is used for sampling the postprandial gastric contents and for determining concentrations of meal, marker, acid, and pepsin, while the latter is used for nonabsorbable marker perfusion, quantification of the second marker's passage, the aspiration of duodenal contents, and the facilitation of suction at the duodenal aspiration site. Measurements of gastric functions after meal ingestion were performed on six healthy volunteers. Despite little variation in the volume of gastric contents during the 1st hr, there were significant increases in the amount of gastric contents emptied into the duodenum. Initial rapid gastric emptying was followed by a steady decrease in the volume of gastric contents emptied into the duodenum until the end of the study. During the 1st hr, the volume of gastric juice secreted resembled the volume of meal emptied through the pylorus. The pH of the gastric contents after meal ingestion approximated 5.0, with a rapid fall to less than 3.0 occurring after 60 min, and to less than 2.0 after 2 hr. Pre- and postprandial acid concentrations increased after ingestion and reached a plateau of about 90 μEq/ml after the 2nd hr. Total gastric acid content also increased rapidly after eating, peaked earlier than acid concentration (at about 1 hr), remained stable for another hour, and then rapidly decreased as the stomach emptied. Gastric acid and pepsin outputs, like total secretory volume, were highest during the 1st hr after eating. Secretory activity fell to near control values 2 hr after meal ingestion. Changes in serum immunoreactive gastrin concentrations followed secretory outputs, increasing twofold during the hour after eating and then slowly decreasing while intragastric pH and gastric secretion also declined.

6173 THE ROLE OF CYCLIC ADENOSINE 3':5'-MONOPHOSPHATE AS "SECOND MESSENGER" IN GASTRIC ACID SECRETION. (Ger.) Domschke, W.; Domschke, S. (Medizinische Univ.-Klinik, D-8520 Erlangen, Krankenhausstrasse 12, W. Germany). *Klin. Wochenschr.* 53(18):841-846; 1975.

Based on a review of animal and human experimentation, the "second messenger" role of cyclic AMP (cAMP) in human and canine gastric secretion is questioned. Four criteria must be satisfied to confer an intracellular function in gastric secretion on cAMP. The intracellular elevation in cAMP must vary directly with the extracellular hormone concentration and occur more or less simultaneously with the physiological effect. Exogenous cAMP should elicit the same effect as the hormone itself, and the tissue response to the hormone should be potentiated by the addition of a phosphodiesterase inhibitor. It has been shown that the cAMP concentration in human gastric mucosa does not increase after maximal gastric secretion stimulation by pentagastrin; nor is there any elevation in patients with hypergastrinemia or its hyperchlorhydric equivalents. This outcome is not necessarily decisive, since pentagastrin and other gastric secretion stimuli also increase phosphodiesterase. Adenylcyclase was not increased and phosphodiesterase was not decreased on histamine stimulation of gastric mucosa in the dog. At least one of the criteria can be unequivocally satisfied in the rat, frog (*Necturus maculosus*), rabbit, and guinea pig either after histamine or gastrin (pentagastrin) challenge; however, some rabbits and guinea pigs fail to respond to all. An overview of published data suggests that species specificity is the determinant, and that intraspecies variation in gastric secretion remains unexplained.

6174 INFLUENCE OF β-ADRENORECEPTOR BLOCKADE ON THE BASAL SECRETION OF THE STOMACH. (Ger.)

Anschelewitsch, J.; Okun, K. (Therapeutische Hospital klinik, Medizinisches Institut, Riga, Bulv. Padomju 12, USSR). *Dtsch. Z. Verdau. Stoffwechselkr.* 35(1): 11-15; 1975.

The effect of β-adrenoblockade on gastric secretion variables in 31 gastrointestinal patients was compared with that in atropine and control groups. The patients received propranolol (4 mg, i.v.) at the start of the second hour of a 2-hr gastric secretion measurement. Propranolol induced a significant depression in basal gastric secretion ($p<0.01$), HCl ($p<0.05$), and proteolytic enzymes ($p<0.01$) of 25%-35%. The concentration of HCl and the total proteolytic activity was unaffected. Propranolol depression was even more pronounced in patients with high initial secretion: gastric secretion, 30% ($p<0.01$); HCl, 35% ($p<0.05$); proteolytic enzymes, 43% ($p<0.01$); HCl concentration, 25% ($p<0.05$); and proteolytic activity, 13% ($p<0.05$). The propranolol effect was approximately equivalent to that of 0.75 mg atropine for all variables except proteolytic activity and HCl concentration. In patients with low initial secretion, propranolol depressed only gastric secretion and proteolytic activity 18%-26% ($p<0.01$); atropine reduced gastric secretion, proteolytic activity, and HCl concentration. The outcome suggests that elevated basal gastric secretion is associated with greater intensity of β-adrenergic processes.

6175 RELEASE OF GASTRIN BY VAGAL STIMULATION IN THE ACID SECRETORY RESPONSE TO FOOD. (Eng.)

Hunt, D. R.; Forrest, A. P. M. (Welsh Natl. Sch. Medicine, Cardiff, Wales). *Ajebak* 54(2):181-189; 1976.

The effect of gastrin release by vagal stimulation on acid secretory response to food was studied in eight dogs (four with innervated and four with denervated pouches made from the fundus of the stomach). All of the dogs had an esophageal fistula. In dogs with denervated pouches, the mean acid outputs (in mM/4 hr) after p.o., tube, and sham feeding (standard meal of homogenized ox-heart) ranged from 0.81 ± 0.17 to 2.23 ± 0.65, 1.23 ± 0.22 to 2.46 ± 0.47, and 0.10 ± 0.02 to 0.26 ± 0.03, resp., before denervation of the pyloric antrum. The corresponding values for dogs with innervated pouches before antral denervation were 8.36 ± 0.80 to 12.86 ± 1.30, 5.05 ± 0.31 to 7.84 ± 1.40, and 0.50 ± 0.11 to 1.46 ± 0.31, resp. After antral denervation, the corresponding values (p.o., tube, and sham feeding) for dogs with denervated pouches were 1.74 ± 0.26 to 2.64 ± 0.44, 1.90 ± 0.45 to 2.37 ± 0.85, and 0.16 ± 0.03 to 0.31 ± 0.09, resp., while those for two dogs with innervated pouches who survived antral denervation were 6.54 ± 0.37 to 9.91 ± 0.56, 4.30 ± 0.38 to 7.09 ± 0.28, and 1.39 ± 0.14 to 2.09 ± 0.16, resp. Only three dogs with denervated pouches survived antral denervation. If vagal release of gastrin were important in dogs with denervated pouches, the acid secretory response to p.o. feeding (by virtue of the cephalic phase acting through an intact vagal nerve supply to the pyloric antrum) should have exceeded that achieved by tube feeding alone; however, the results showed that the acid secretory responses to p.o. and tube feeding were about the same. In dogs with innervated pouches, the response to p.o. feeding exceeded that of tube feeding. Denervation of the antrum did not decrease the sham response in either group of dogs. Moreover, no significant stimulation of acid secretion from denervated pouches could be demonstrated with sham feeding. Since an adequate secretory response was observed in dogs with innervated pouches, this observation cannot be attributed to an inadequate stimulus. Although the acid output after a normal meal (p.o. feeding) exceeded the sum of the acid outputs by separate vagal (sham feeding) and gastric (tube feeding) stimulation in dogs with innervated pouches, the findings indicate that this increased acid output does not appear to be attributable to the effect of gastrin released by vagal stimulation.

6176 RELEASE OF GASTRIC INHIBITORY POLYPEPTIDE: COMPARISON OF HYPEROSMOLAR CARBOHYDRATE SOLUTIONS AS STIMULI. (Eng.)

Martin, E. W., Jr.; Sirinek, K. R.; Crockett, S. E.; O'Dorisio, T.; Mazzaferri, E. L.; Thomford, N. R.; Cataland, S. (Ohio State Univ. Coll. Medicine, Columbus, OH). *Surg. Forum* 26:381-382; 1975.

Because previous studies have indicated that intraduodenal glucose is a potent stimulus for the release of endogenous gastric inhibitory polypeptide (GIP), the GIP response to a variety of carbohydrate solutions was compared in six dogs with Mann-Bollman fistulas. Both 10% (556 mOsm/l) and 20% (1,112 mOsm/l) glucose were potent stimuli for the release of GIP at 5-180 min after the introduodenal instillation of the solutions over a 10-min period; the mean responses ranged between 285 and 1,016 pg/ml. However, the GIP response to 20% glucose was significantly ($p<0.05$) greater at 15 min (1,016 pg/ml) than at 30 min (942 pg/ml). GIP release was not observed with hyperosmolar solutions of galactose (556 mOsm/l) or mannitol (1,112 mOsm/l). The results suggest that the response to glucose is dose-related and that duodenal osmoreceptors do not have a primary role in the physiologic release of endogenous GIP.

6177 INFLUENCE OF HISTAMINE H_2 RECEPTOR BLOCKERS ON THE BIOSYNTHESIS AND DECOMPOSITION OF HISTAMINE IN THE GASTRIC MUCOSA. (Ger.)

Femppel, J.; Maslinski, S.; Sewing, K. F. (No affiliation given). *Z. Gastroenterol.* 14(Suppl.):252; 1976.

The effect of the histamine H_2 receptor inhibitors, metiamide (MA) and cimetidine (CD), on histidine carboxylase activity and histamine methylation in gastric mucosa was studied. Histidine carboxylase activity was assayed fluorimetrically in rat gastric mucosa homogenates whose acid secretion had been stimulated for up to 90 min with pentagastrin (2.5 μg/kg/min), without and after pretreatment with metiamide (2.5 mg/kg). Ring methylation was assayed radiochromatographically in guinea pig gastric mucosa with and without pretreatment with three doses of cimetidine (25 mg/kg). Pentagastrin-induced acid secretion was inhibited by metiamide, but the histamine content of the gastric mucosa was unaffected, independent of treatment. Histidine carboxylase activity rose 30 min post-pentagastrin, exceeding 100% after 90 min. Metiamide blocked histidine carboxylase elevation completely. Pentagastrin had no effect on histamine ring methylation, which was increased by about 25% by cimetidine.

6178 HISTAMINE H_2-RECEPTOR ANTAGONISTS.

(Eng.) Sewing, K.-Fr. (Pharmakologisches Institut der Universitat Tubingen, Wilhelmstr. 56, D-7400 Tubingen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 23(3):221-226; 1976.

A general review of studies involving the action of histamine H_2-receptor antagonists and their therapeutic relevance to gastrointestinal tract disorders is presented. H_2-receptor antagonists are powerful blockers of gastric acid secretion stimulated by histamine, pentagastrin, and food, and have led to the discovery of a number of previously unknown H_2-receptor localizations, including five in the guinea pig intestine. The first histamine H_2-receptor antagonist discovered was burimamide; because of its poor absorption after p.o. administration, this receptor has fallen into disfavor in light of the discovery of metiamide, which has the same histamine H_2-receptor antagonist properties and is absorbed p.o. Metiamide has been shown to be effective in preventing the occurrence of ulcers produced by pentagastrin or histamine in cats and has been effective in man in reducing basal, stimulated, and nocturnal secretions in both healthy volunteers and duodenal ulcer patients. Another H_2-receptor antagonist, cimetidine, has gained interest because it is about as effective as metiamide in blocking H_2-receptors and is devoid of metiamide's agranulocytosis-producing properties. In two open trials, cimetidine has been useful in treating 11 patients with gastric ulcer and 19 patients with active duodenal ulceration. Gastric mucosal damage produced by acetyl-salicylic acid has also been shown to be prevented by cimetidine. It appears that histamine H_2-antagonists will be useful in the management of diseases in which mucosal damage of the upper gastrointestinal tract is the predominant feature.

6179 MECHANISM OF METIAMIDE INHIBITION OF GASTRIC ACID SECRETION.

(Eng.) Brown, B. N.; Charters, A. C., III.; Orloff, M. J. (Univ. California Sch. Medicine, La Jolla, CA). *Surg. Forum* 26:357-359; 1975.

The components of the cyclic AMP (cAMP) system during metiamide inhibition of acid secretion were examined in the isolated frog gastric mucosa to determine whether metiamide blocks this intracellular pathway. Metiamide (10^{-5} M) caused a significant inhibition of pentagastrin (10^{-5} M)-stimulated gastric acid secretion (44% of maximal stimulation, $p<0.05$). A 10-fold higher dose of metiamide caused a similar inhibitory effect (45% of maximal stimulation, $p<0.05$). The addition of 10^{-5} M metiamide to hypersecreting mucosae (>125 $m\mu Eq/cm^2/min$) also produced a significant inhibition of acid secretion (51%, $p<0.05$). The inhibition of acid secretion was not accompanied by a consistent pattern of change in cAMP concentration, adenyl cyclase activity, or phosphodiesterase activity. The higher dose of metiamide (10^{-4} M) and the addition of 10^{-5} M metiamide to the hypersecreting mucosae caused a greater increase in cAMP (2.73 pM/mg), than that in pentagastrin-stimulated mucosae (1.45 pM/mg) and mucosae incubated with 10^{-5} M metiamide and pentagastrin (1.76 pM/mg). Metiamide does not appear to inhibit acid secretion by blocking the formation of cAMP. The observed increase in cAMP levels accompanying the fall in acid secretion could be interpreted to suggest that metiamide blocks the effects of cAMP by interrupting the intracellular pathways at some later step. These results do not support the conclusion that metiamide blocks histamine stimulation of adenyl cyclase activity in a cell-free preparation of guinea pig gastric mucosa.

6180 THE EFFECT OF ACUTE HYPERGLYCEMIA ON MEAL-STIMULATED GASTRIC, BILIARY, AND PANCREATIC SECRETION, AND SERUM GASTRIN.

(Eng.) MacGregor, I. L.; Deveney, C.; Way, L. W.; Meyer, J. H. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Gastroenterology* 70(2):197-202; 1976.

The effects of hyperglycemia on human pancreatic, biliary, and gastric secretory responses to meals were investigated. Following an overnight fast, seven normal healthy subjects took a 500-ml liquid test meal containing 38 g of corn oil and 63 g of nonfat milk powder (22 g protein and 33 g carbohydrate). Hyperglycemia was induced with a bolus injection of glucose (150 mg/kg, i.v.) followed by a glucose infusion (10 mg/kg/min, i.v.) that was continued throughout the 150-min duration of the study. A jejunal perfusion method was used to measure pancreatic outputs of trypsin and biliary outputs of bile salts and to indirectly quantify the amount of acid secreted by the stomach. Serum gastrins were also measured basally and at intervals after the meal. Data from six evaluable subjects showed that the glucose load suppressed gastric acid secretion in response to the test meal; this suppression was most marked in the first 60 postcibal min, coinciding with the period of most marked hyperglycemia. Total acid output for the 150-min test period was suppressed in five hyperglycemic subjects, with the mean value being 21.25 ± 3.58 mEq compared to a mean control value of 29.11 ± 4.32 mEq ($p<0.05$). Trypsin output was also reduced from a mean control level of 53,287 ± 5209 U to a level of 32,908 ± 6674 U in hyperglycemic subjects ($p<0.025$). Bile salt output was decreased from a mean control value of 3221 ± 340 mg to 1675 ± 350 mg in hyperglycemic individuals ($p<0.025$). The mean serum gastrin concentration was significantly reduced ($p<0.025$) only for 30-min samples; at this time the mean value for five evaluable hyperglycemic subjects was approximately 65 pg/ml, compared with a control value of about 90 pg/ml. Hyperglycemia, which is acutely induced by i.v. glucose infusions, has a variety of suppressive effects on the gastrointestinal function of normal subjects.

6181 IMPLICATIONS OF THE NEUTRAL CARRIER OF Cl^--HCO_3^- EXCHANGE MECHANISM IN GASTRIC MUCOSA. (Eng.) Rehm, W. S.; Sanders, S. S. (Univ. of Alabama in Birmingham, Medical Center, Birmingham, AL 35294). *Ann. N.Y. Acad. Sci.* 264:442-455; 1975.

6182 NONCOVALENT FORCES HOLD GLYCOPROTEIN MOLECULES TOGETHER IN MUCOUS GEL [Abstract]. (Eng.) Robson, T.; Allen, A.; Pain, R. H. (Dept. Biochemistry, Univ. Newcastle upon Tyne, Newcastle upon Tyne, NE1 7RU, U.K.). *Biochem. Soc. Trans.* 3(6):1105-1107; 1975.

6183 INTRACELLULAR pH CHANGES IN FROG GASTRIC MUCOSA [Abstract]. (Eng.) Hersey, S. J. (Emory Univ., Atlanta, GA 30322). *Fed. Proc.* 35(3): 539; 1976.

6184 H^+ AND HCO_3^- ACCUMULATION IN FROG GASTRIC MUCOSA AS ESTIMATED FROM DMO WASHOUT KINETIC [Abstract]. (Eng.) Villegas, L. (Instituto Venezolano de Investigaciones Cientificas, IVIC, Caracas 101, Venezuela). *Biophys. J.* 16(2, part 2): 5a; 1976.

6185 BIOGENIC MONOAMINES IN THE GASTRIC WALL OF THE PROTEIN DEPLETED RATS [Abstract]. (Eng.) Gombos, A.; Marsala, A.; Stopek, J. (Dept. Anatomy, Sajarik Univ., Kosice, Czechoslovakia). *Folia Morphol. (Praha)* 23(3):286-288; 1973.

6186 LOCALIZATION OF THE PARIETAL CELL ANTIGENS STUDIED ON VIABLE SEPARATED GASTRIC CELLS [Abstract]. (Eng.) Zeitoun, P.; Voillemot, N.; Lewin, M. (No affiliation given). *Acta Hepatogastroenterol. (Stuttg.)* 22(6):422; 1976.

6187 CORRELATION OF GASTRIC ACID SECRETION MEASURED BY INTRAGASTRIC TITRATION (IT) AND CONVENTIONAL ASPIRATION TECHNIQUE (Asp. Te.) IN HEALTHY HUMAN SUBJECTS [Abstract]. (Eng.) Halter, F.; Keller, M. (Univ. Hosp., Inselspital Berne, Switzerland). *Acta Hepatogastroenterol. (Stuttg.)* 23(1):77-78; 1976.

6188 THE PRESENCE OF THE DUODENAL BULB AND THE INHIBITORY MECHANISM OF GASTRIC ACID SECRETION [Abstract]. (Eng.) Matsuo, Y.; Kitamura, T. (3rd Dept. Internal Medicine, Univ. Tokyo, Tokyo, Japan). *Gastroenterol. Jpn.* 10(3):228; 1975.

6189 THE ROLE OF CALCIUM IN GASTRIC ACID AND PEPSIN SECRETION [Abstract]. (Eng.) Hotz, J.; Goebell, H.; Ziegler, R. (Dept. Internal Medicine, Univ. Ulm, Ulm, W. Germany). *Digestion* 13(1/2):112; 1975.

6190 STIMULATION OF SERUM GASTRIN LEVELS AND GASTRIC ACID SECRETION IN THE RAT BY DUODENAL ULCEROGENIC AGENTS [Abstract]. (Eng.) Lichtenberger, L. M.; Szabo, S.; Trier, J. S. (Peter Bent Brigham Hosp., Boston, MA 02115). *Fed. Proc.* 35 (3):217; 1976.

6191 EFFECT OF CIMETIDINE (CIM), A NEW H-2 ANTAGONIST ON CANINE GASTRIC SECRETION [Abstract]. (Eng.) Hirschowitz, B.; Gibson, R. (Div. Gastroenterology, Univ. Alabama, Birmingham, AL 35294). *Fed. Proc.* 35(3):539; 1976.

6192 NEONATAL GASTRIC HYPERACIDITY. FURTHER ANALYSIS OF OXYTOCIN EFFECT [Abstract]. (Eng.) Davidson, D. C.; Rogers, I. M.; Ardill, J.; Buchanan, K. D. (Fazakerley Maternity Hosp., Liverpool, England). *Arch. Dis. Child.* 50(10):818-820; 1976.

6193 GASTRIC ANTISECRETORY EFFECTS OF E-PROSTAGLANDINS IN CONSCIOUS MONKEYS [Abstract]. (Eng.) Dajani, E. Z.; Callison, D. A.; Bianchi, R. G.; Driskill, D. R. (SEARLE Lab., P.O. Box 5110, Chicago, IL 60680). *Fed. Proc.* 35(3):539; 1976.

SECRETION AND METABOLISM

6194 INHIBITION OF GASTRIC K+ ATPase BY SALICYLATES [Abstract]. (Eng.) Spenney, J. G. (Div. Gastroenterology, Univ. Alabama, Birmingham, AL 35294). *Fed. Proc.* 35(3):539; 1976.

6195 ACID SECRETION AND GASTRIN RELEASE DURING ELECTRICAL VAGAL STIMULATION IN ANESTHETIZED CATS [Abstract]. (Eng.) Bauer, R. F.; Brooks, F. P. (Univ. Pennsylvania, Philadelphia, PA 19174). *Fed. Proc.* 35(3):217; 1976.

6196 PREVENTION OF PROPIONITRILE- OR CYSTEAMINE-INDUCED DUODENAL ULCER BY VAGOTOMY OR HYPOPHYSECTOMY IN RATS [Abstract]. (Eng.) Haith, L. R., Jr.; Szabo, S.; Reynolds, E. S. (Peter Bent Brigham Hosp., Boston, MA). *Clin. Res.* 23(5):577A; 1975.

See also, 6332, 6470, 6471, 6483.

SECRETION AND METABOLISM

Pancreas

6197 A NEW TECHNIQUE FOR THE STUDY OF THE EXOCRINE PANCREATIC SECRETION IN THE RAT. (Fre.) Roze, C.; De La Tour, J.; Chariot, J.; Souchard, M.; Debray, C. (Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Biol. Gastroenterol. (Paris)* 8(4):291-295; 1975.

The continuous perfusion of a diluting fluid has significantly improved the collection and determination of the main constituents of pancreatic fluid excreted from fistulized anesthetized Wistar rats. The determination of sodium excretion provided a good approximation of the amount of excreted pancreatic fluid. Bicarbonates were determined by Technicon autoanalysis and proteins by UV absorption or Lowry's method. The volume of pancreatic secretion increased slowly from about 7 hr after fistulization. Concentration of sodium remained stable in control rats, but rose sharply in response to 2.5 IU/kg/hr of secretin. Total protein excretion was elevated initially but fell rapidly and stabilized at 3-8 hr. The best time for observation of pancreatic excretion appears to be 4-8 hr following insertion of the fistula.

6198 IMMUNOLOGICAL STUDIES OF THE PANCREAS. (Ger.) Friemel, H.; Brock, J.; Schutt, C.; Zastrow, R.; Velbri, S. (Klinik fur Innere Medizin, Universitat Rostock, 25 Rostock, Leninallee 70, E. Germany). *Z. Gesamte Inn. Med.* 30(12): 415-419; 1975.

The first clinical results for demonstrating circulating pancreatic antigens are reported. Postmortem (5 hr) human pancreas and rabbit and horse antisera were used; blood samples were taken from patients with clinically confirmed acute or chronic pancreatitis. Zone electrophoresis of pancreatic extract identified organotypical proteins, and agar gel electrophoresis found one anodic and three cathodic fractions. Polyacrylamide disk electrophoresis showed at least 24 protein bands. At least seven immunologically unique pancreatic antigens, including albumin, α_1-antitrypsin, haptoglobin, transferrin, and immunoglobulins G (IgG) and A, were recovered in reacting human serum and pancreatic extract with nonabsorbed antipancreas immune serum. In reacting pancreatic extract with absorbed antiserum, 15 precipitation lines developed, whose electrophoretic mobility ranged between albumin and the slow IgG region. The Sephadex elution profile of human extract identified five serum-free fractions; fraction 5 was established as antigenic. Cell immunity against pancreatic antigen was demonstrated in several cases of chronic pancreatitis by lymphocyte transformation tests, and in several cases of acute pancreatitis, circulating pancreatic antigens were detectable.

6199 INTERACTION OF PORCINE VASOACTIVE INTESTINAL PEPTIDE WITH DISPERSED PANCREATIC ACINAR CELLS FROM THE GUINEA PIGS. STRUCTURAL REQUIREMENTS FOR EFFECTS OF VASOACTIVE INTESTINAL PEPTIDE AND SECRETIN ON CELLULAR ADENOSINE 3':5'-MONOPHOSPHATE. (Eng.) Robberecht, P.; Conlon, T. P.; Gardner, J. D. (Univ. Brussels Medical Sch., 1000 Brussels, Belgium). *J. Biol. Chem.* 251(15):4635-4639; 1976.

The effects of secretin and vasoactive intestinal peptide (VIP), as well as their respective analogs and fragments, on cellular cyclic AMP (cAMP) in dispersed pancreatic acinar cells from guinea pigs were investigated. Secretin appeared to interact with a single class of high-affinity receptors to produce a 10-fold increase in cellular cAMP, with the half-maximal stimulation occurring at a secretin concentration of 2×10^{-10} M. In contrast to secretin, the dose-response curve for VIP-stimulated cellular cAMP was biphasic and appeared to reflect the interaction of VIP with two functionally distinct classes of receptors. The interaction of VIP with a high-affinity class of receptors (half-maximal stimulation at 4 x 10^{-10} M VIP) produced a threefold increase in cellular cAMP, whereas the interaction of VIP with low-affinity receptors (half-maximal stimulation at 10^{-7} M) produced a sixfold increase in cellular cAMP. Studies with synthetic fragments of VIP and secretin indicated that the receptor having a high affinity for VIP has a low affinity for secretin and interacts with, but does not distinguish between, secretin, secretin 5-27, and [6-tyrosine]secretin or between secretin 14-27, VIP 14-28, and VIP 15-28; this high-affinity receptor for VIP increases cellular cAMP when occupied by VIP, but not when occupied by secretin, [6-tyrosine]secretin, or secretin 1-14. The receptor having a low affinity for VIP has a high affinity for secretin and interacts with and distinguishes between secretin, secretin 5-27, and [6-tyrosine]secretin; this low affinity receptor for VIP also interacts with secretin 14-27, but not with VIP 14-28 or VIP 15-28. It increases cellular cAMP when occupied by VIP, secretin, [6-tyrosine]-secretin, or secretin 1-14. Two receptors appear to mediate the stimulation of cAMP in dispersed guinea pig pancreatic acinar cells.

6200 PANCREATIC FUNCTION AFTER TRUNCAL VAGOTOMY: ANIMAL EXPERIMENTS ON PIGS AND RATS. (Ger.) Loeweneck, H.; Bruckner, W. L.; Maass, U.; Appel, G.; Schmidt, G. P. (Anatomisches Institut, Abtlg. fur experimentelle Morphologie, D-8 Munchen 2, Pettenkoferstrasse 11, W. Germany). *Z. Gastroenterol.* 13(4):457-463; 1975.

Blood sugar levels after glucose loading, changes in fasting blood sugar, variations in serum α-amylase, and islet modifications were investigated 3-10 weeks after truncal vagotomy (TV) in 52 Wistar rats and 17 pigs. Glucose tolerance tests (0.5 g/kg, i.v.) were performed on 5 vagotomized pigs and 12 controls. Fasting blood sugar was determined in 20 vagotomized rats after pyloroplasty and in 32 vagotomized rats without pyloroplasty. There were no significant differences in the blood sugar levels of vagotomized and control pigs after glucose loading. All vagotomized animals without pyloroplasty had pyloric stenosis. Even after 24 hr fasting, the stomachs were dilated and full. The fasting blood sugar level in vagotomized pigs and rats was 37% lower than in controls. After vagotomy the α-amylase concentration in fasting pigs rose from 1,429 U/I to 7,650 U/I; in vagotomized rats with pyloroplasty, the amylase level fell from 2,241 U/I to 1,751 U/I. A clustering of A-cells in the marginal zone of the islets of Langerhans was found 5 weeks postvagotomy; the mantel sometimes consisted of five cell rows. The A:B cell ratio was 1:1.4, somewhat lower than the normal 1:2.3. I.v. glucose loading responses in vagotomized pigs do not differ significantly from those of controls.

6201 EFFECT OF ACUTE IRRADIATION ON THE EXOCRINE SECRETION OF THE PANCREAS IN THE PIG. (Fre.) Corring, T.; Daburon, F.; Remy, J. (Centre National de la Recherche Zootechnique, I.N.R.A., 78350 Jouy-en-Josas, France). *Strahlentherapie* 149(4):417-425; 1975.

Exocrine pancreas secretion was studied in six castrated male pigs (Large White strain) 8 days prior to exposure to acute, partial irradiation and for 11 days after. Fistulas to the pancreatic duct and to the duodenum were created in the pigs, the first for extraction of fluids and the other for recirculation after analysis. Four animals received a postdiaphragmatic irradiation of 800 rads, and two others were subjected to 600 rads. Four samples of pancreatic juice were analyzed every 24 hr. After irradiation, the pigs' temperatures rose, and diarrhea was common; four pigs recovered, while two/four that had received 800 rads died. Regardless of dose, irradiation caused an immediate decrease in the volume of pancreatic secretion and in total enzymatic activity. The proteolytic enzyme (chymotrypsin and trypsin) levels remained unchanged while in each animal lipase levels decreased for the first 3 days and then increased until the 11th day, where they finally stabilized at 180-210% of the original concentration. Immediately after irradiation, amylase levels rose to 125% of their initial value and then returned to the preirradiation level. These results show a direct action of irradiation on the pancreas, either stimulatory or inhibitory. When secretin (1 IU/kg) was injected on the 5th day after irradiation the volume of pancreatic secretion increased immediately, suggesting a possible indirect action of radiation that affects the regulatory system. A feedback effect from the stomach is also possible.

6202 LATE EVOLUTION OF PROTEINS WATER AND BICARBONATE SECRETION IN THE DOG CHRONIC ALCOHOLIC PANCREATITIS [Abstract]. (Eng.) Tiscornia, O. M.; Sarles, H.; Palasciano, G. (INSERM U-31, 46, chemin de la Gaye, F-13009 Marseille, France). *Digestion* 13(3):188; 1975.

6203 EFFECTS OF SOMATOSTATIN ON PANCREATIC EXOCRINE FUNCTION. INTERACTION WITH SECRETIN. (Eng.) Deschodt-Lanckman, M.; Robberecht, P.; Pector, J. C.; Christophe, J. (Laboratoire de Chimie biologique et de la Nutrition, Universite libre de Bruxelles, Belgium). *Arch. Int. Physiol. Biochim.* 83(5):960-961; 1975.

6204 THE ROLE OF BILE PANCREATIC JUICE AND LYSOLECITHIN IN THE PATHOGENESIS OF EXPERIMENTAL PORCINE STRESS ULCER [Abstract]. (Eng.) Kalima, T.; Kivilaakso, E.; Lempinen, M. (Second Dept. Surgery, Univ. Helsinki, Helsinki, Finland). *Scand. J. Gastroenterol.* 10(34):43; 1975.

6205 INCREASED SENSITIVITY OF RAT PANCREATIC ACINI TO CHOLINERGIC STIMULATION WITH AGE [Abstract]. (Eng.) Larose, L.; Morisset, J. (GI Res. Unit, Sherbrooke Univ., Sherbrooke, P.O. J1K 2R1, Canada). *Digestion* 13(3):177; 1975.

6206 MICROFILAMENTS AND ENZYMATIC SECRETION IN THE EXOCRINE PANCREAS. EFFECT OF CYTOCHALASIN B [Abstract]. (Eng.) Stock, C.; Vincent, D.; Grenier, J. F.; Bauduin, H. (INSERM U-62, F-67200 Strasbourg, France). *Digestion* 13(3):187-188; 1975.

See also, 6132, 6180.

SECRETION AND METABOLISM

Hepatobiliary Tract

6207 METHOD FOR MEASURING HEPATIC UPTAKE OF OXYGEN OR OTHER BLOOD-BORNE SUBSTANCES IN SITU. (Eng.) Lautt, W. W. (Coll. Medicine, Univ. Saskatchewan, Saskatoon, Saskatchewan S7N 0W0, Canada). *J. Appl. Physiol.* 40(2):269-274; 1976.

An *in situ* method for the continuous recording of hepatic venous and arterial blood flow while measuring hepatic and splanchnic oxygen uptake in the intact liver of the cat is described. The total outflow of the liver is measured directly as it flows into an external reservoir by an electromagnetic flowmeter. Calibration does not interfere with the hepatic blood flow. The proportion of the hepatic artery flow is determined by a second electromagnetic flowmeter, and the *in situ* calibration of the flow probe is achieved by occluding the hepatic artery with a loop of thread and timing the rate of blood flow through a splenic arterial cannula. Oxygen uptake by the denervated liver in 13 splenectomized cats was 4.5 ± 0.3 ml/min/100 g, representing 54% of the total oxygen removed by the splanchnic bed. The metabolic state of the liver remained stable for at least 2 hr, during which an average of 29 1-ml blood samples were taken from 3 cats. The decrease in hematocrit was less than 3 U. The presence of an extracorporeal blood reservoir is important for repeated metabolic determinations, because equilibrated blood from the reservoir can be used for volume replacement. The method obviates the limitations of isolated perfused liver preparations associated with alterations in the metabolic state of the liver.

6208 THE HEPATIC CLEARANCE OF CIRCULATING NATIVE AND ASIALO CARCINOEMBRYONIC ANTIGEN BY THE RAT. (Eng.) Thomas, P.; Hems, D. A. (Chester Beatty Res. Inst., Royal Cancer Hosp., Fulham Road, London, SW3 6JB, U.K.). *Biochem. Biophys. Res. Commun.* 67(3):1205-1209; 1975.

The fate of circulating native and asialo-carcinoembryonic antigens (CEA), in concentrations larger than those in previous studies, were studied in intact Sprague-Dawley rats and in perfused rat livers. The changes in immunologically active glycoprotein were followed with a radioimmunoassay (rather than with iodine-labeled material, as in previous studies). Female rats received CEA (90 μg) i.v. The intact rat accumulated 76% of CEA in the liver, 2% in the spleen, and 3% in the lung. The half-life of the native glycoprotein in the liver perfusion system was 28 min, while that of the asialo-glycoprotein was 11 min. In both cases, the time course for removal of glycoprotein from the perfusate was first order. After 90 min of perfusion, about 10% of the glycoprotein was found in the bile. The rapid uptake of the native glycoprotein suggests that the recognition of terminal galactose may not be the only factor involved in determining the hepatic assimilation of glycoproteins.

6209 ENZYMATIC ANALYSIS OF BILE ACIDS. (Eng.) Macdonald, I. A. (Dept. Medicine, Dalhousie Univ., Halifax, Nova Scotia, B3H 4H7 Canada). *Clin. Biochem.* 9(3):153-154; 1976.

The use of enzymes and thin-layer chromatography (TLC) in quantifying individual bile acids from bile or serum is reviewed. Both 3α-hydroxysteroid dehydrogenase (3α-HSDH) from *P. testosteroni* and 7α-hydroxysteroid dehydrogenase from *Escherichia coli* can be used for spectrophotometric or fluorometric measurement of individual bile acids in TLC eluates. Pool size and half-life of serially labeled samples can be estimated using these enzymes, provided enzymatically measurable minor bile acid components and enzymatically nonmeasurable compounds (such as ketobile acids and bile-acid sulphates) are present in negligible amounts. As many as 200 individual bile samples have been analyzed in this way, and the method has been extended to serum. Technical difficulties, such as interference in the 3α-HSDH assay by free fatty acids, ethanol, and other higher alcohols, and loss of linearity at the upper end of the calibration curve, can be physically avoided. The use of ethanol and higher alcohols is avoided with the 7α-HSDH assay also.

6210 BILE ACID POOL IN WISTAR RATS. (Eng.) Fisher, M. M.; Kakis, G.; Yousef, I. M. (Dept. Medicine and Pathology, Univ. Toronto, Toronto, Ontario, Canada M5S 1AB). *Lipids* 11(2):93-96; 1976.

The size of the bile acid pool in male and female

200-g Wistar rats was studied. Six male and six female rats received standard laboratory chow during the 3-week study period, and similar numbers of rats received a powdered semisynthetic diet. The total bile acid pool was approximately 100 µmol in animals on the chow diet and 60 µmol in those on the semisynthetic diet. Regardless of sex or diet, 97% of the bile acid pool was located in the intestinal tract. There was no sex difference in the size of the bile acid pool nor in the concentration of bile acids in the intestinal tract or blood. However, the females fed the chow diet had a significantly higher hepatic bile acid concentration (0.33 µmol/g liver) than did the males (0.19 µmol/g). Cholic acid comprised 55-73% of the bile acid pool. In the intestinal tract of the female rats, the molar percent distribution of cholic acid (71.3 in those on chow, 63.3 in those on semisynthetic diet), lithocholic acid (1.6 and 2.0, resp.), and, in those receiving the semisynthetic diet, chenodeoxycholic acid (14.6) was higher than in males (cholic, 54.8 in those on chow, 55.4 in those on semisynthetic diet; lithocholic, 0.8 and 0.8, resp.; chenodeoxycholic, 11.1). The relative concentrations of deoxycholic acid, β-muricholic acid, and hyodeoxycholic acid were significantly higher in males. The estimated bile acid pool size in these experiments is at least twice that of published estimates. The observation that both the concentration and relative composition of the bile acids in the blood plasma reflected changes in the bile acid content of the intestinal tract suggests that analysis of plasma bile acids might prove useful in future studies on the bile acid pool in general.

6211 A PROBABLE ESSENTIAL DERIVATIVE OF LINOLEIC ACID: LIPOIC ACID, UNIVERSAL COENZYME OF THE OXIDATION OF ALPHA-KETONE ACIDS.

(Fre.) Carreau, J.-P.; Lapous, D.; Raulin, J. (Hopital de Bicetre, 94270 Le Kremlin-Bicetre, France). *C. R. Acad. Sci. [D] (Paris)* 281(13):941-944; 1975.

To determine the metabolite(s) of the "essential" fatty acids responsible for the "essential" character, ^{14}C-labeled linoleic acid (LI) or oleic acid (OL, 1 µCi) was injected in 6-day-old rats born of mothers fed a lipid deficient diet during the last two-thirds of pregnancy. Rats were sacrificed 3 hr later and their livers were homogenized in a chloroform-methanol-water mixture. After decantation of the liposoluble phase, the alcohol-water and macromolecule phases were subjected to electrophoresis, gas-liquid chromatography, and mass spectrophotometry. On analysis, the substance covalently bound to the proteins, and could only be separated by hydrolysis with 6 N HCL, suggesting a lipoic acid, the universal coenzyme of the multienzyme complex of oxidative decarboxylations. The significance of lipoic acid in the metabolic chain, which appears to originate from linoleic acid, has not been determined.

6212 METABOLISM OF SHORT CHAIN FATTY ACID IN RAT LIVER IN BILIARY OBSTRUCTION.

(Eng.) Koyama, K.; Kashimura, S.; Yamauchi, H.; Takagi, Y.; Owada, Y.; Sato, T. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 117(4):335-341; 1975.

In an attempt to clarify the hepatic insufficiency in obstructive jaundice, the hepatic metabolic rate of n-butyric acid, ketogenesis, and CO_2 formation from butyric acid were investigated using liver slices obtained from Wistar rats subjected to choledochal ligation or injected i.p. with 20% carbon tetrachloride (1 ml/100 g). The hepatic metabolic rate of n-butyric acid was reduced with the prolongation of biliary obstruction. The reduction was presumed to be caused for the most part by the reduced ketogenesis (which also decreased with the duration of biliary obstruction), and in part, by the impairment of the citric acid cycle (TCA-cycle). Three to four weeks after biliary obstruction, the metabolic rate was reduced to a level comparable to liver necrosis produced by CCl_4. It is postulated that this reduction is one of the pathogenic factors in fatal liver insufficiency in many cases of obstructive jaundice. Although the reduction is mild and mobile in the early stage of jaundice, the obstruction should be relieved as early as possible.

6213 VALUE OF LYSOSOMAL ENZYMES IN CANINE LIVER PRESERVATION.

(Eng.) Smeesters, C.; Bloch, P.; Fourtanier, G.; Corman, J. L.; Daloze, P. M. (Hopital Notre-Dame, Montreal, Canada). *Surg. Forum* 26:431-433; 1975.

Because of the importance of the release of lysosomal enzymes in liver ischemia, potential liver viability was correlated with the activity of lysosomal β-galactosidase (BGa) released during and after two modes of liver preservation in dogs. Seventeen controls underwent either liver autotransplant or orthotopic transplant of homologous livers, revascularized immediately after their perfusion or excision. In the first experimental group, six livers were homotransplanted after a 24-hr continuous semipulsatile perfusion with an albumineous extracellular perfusate at 15 C. In experimental group 2, 10 livers were homotransplanted after infusion with hyperosmolar intracellular type of ice-cold preservation fluid in which they were subsequently stored for 24 hr at 4 C. In group 1, perfusate BGa activities increased exponentially until the end of perfusion. In group 2, only negligible activity was detected at any time in the infusates. In both groups, maximal BGa activity was usually measured in the recipients' serum within 2-3 hr after revascularization of the preserved organs. The mean maximum BGa value in the four animals in group 1 that survived more than 48 hr was 4,116 mU/g protein/100 ml sample; in the unsuccessful transplants, the mean value was 8,954 mU/g/100 ml. The maximum BGa value in six surviving animals in group 2 was 2,744 mU/g/100 ml, and for the nonsurviving animals, it was 10,099 mU/g/100 ml. In all surviving animals, these values returned to near normal levels from the first postoperative day on and remained at normal values on subsequent days. Lysosomal BGa activity appears to be a sensitive index of the degree of liver damage sustained during preservation. BGa activity also appears to be valuable in the perfusion procedures in predicting liver viability before transplantation.

6214 DIETARY FATS AND PROPERTIES OF ENDOPLASMIC RETICULUM: II. DIETARY LIPID INDUCED CHANGES IN ACTIVITIES OF DRUG METABOLIZING ENZYMES IN LIVER AND DUODENUM OF RAT.

(Eng.) Hietanen, E.; Laitinen, M.; Vainio, H.; Hanninen, O. (Dept. Physiology, Univ. Kuopio, SF-70100 Kuopio, Finland). *Lipids* 10(8):467-472; 1975.

Thirty male Wistar rats were fed cholesterol, cacao butter, olive oil, or standard control diets for 4 weeks to determine the effect of dietary lipids on the rate of drug biotransformation in the liver and duodenum. The cholesterol-rich diet maintained the hepatic aryl hydrocarbon hydroxylase activity at the same level as did the standard diet. Rats fed olive oil and cacao butter diets showed lower hepatic aryl hydrocarbon hydroxylase activity (10-15% of the standard diet). The *p*-nitroanisole *O*-demethylase activity was doubled in the hepatic microsomes of rats fed the high cholesterol diet, compared with rats fed the standard diet. The hepatic uridine diphosphate glucuronosyltransferase activity showed different patterns, depending on the *in vitro* treatment of the microsomal membranes. If the enzyme activity was assayed from the native, untreated microsomes, an increase in the measurable uridine diphosphate glucuronosyl transferase activity was found in rats on the cholesterol-rich diet. After the *in vitro* activation of membrane-bound uridine diphosphate glucuronosyltransferase by trypsin, the increase in measurable activity was 10-fold in the group fed the standard diet, 6-fold in group fed cholesterol, 4-fold in group fed cacao butter, and 3-fold in group fed olive oil. Trypsin digestion of microsomes increased the measurable uridine diphosphate glucuronosyltransferase activity less in rats fed diets rich in neutral fats than those fed the standard diet. In the duodenal mucosa, the aryl hydrocarbon hydroxylase activity in the rats fed the lipid diets was 30-50% of that in the rats fed the standard diet. The intestinal uridine diphosphate glucuronosyltransferase activity was highest in the standard diet and cholesterol groups. The rats fed neutral fat diets showed 50-80% of the activity found in the group fed the standard diet. It is concluded that excessive dietary lipids may interfere with the hepatic and intestinal capacity to detoxify drugs.

6215 INDIVIDUAL DIFFERENCES IN THE OCCURRENCE OF A LIPID PEROXIDATION INHIBITOR IN RAT LIVER SOLUBLE FRACTION.

(Eng.) Kamataki, T.· Aikawa, K.; Ozawa, N.; Kitagawa, H. (Dept. Biochemical Pharmacology, Faculty Pharmaceutical Sciences, Univ. Chiba, Yayoi-cho, Chiba 280, Japan). *Jpn. J. Pharmacol.* 25(6):793-796; 1975.

Individual differences in the occurrence of lipid peroxidation inhibitor in the cytosol of rat liver were studied, and the effect of these differences on the activity of ethylmorphine N-demethylase was examined. Preincubation of the 9.000 x *g* supernatant of male Wistar rat liver with an NADPH-generating system resulted in lipid peroxidation. Among the livers of five rats, the amount of lipid peroxidation was small (0.72-2.04 nmol malondialdehyde formed/mg microsomal protein/30 min) in three and markedly higher (13.74-15.13 nmol/mg/30 min) in the other two. When 33 μM EDTA was added to the preincubation medium, lipid peroxidation was almost completely inhibited, and no difference in the levels of lipid peroxidation was seen between the various rats. The effects of the preincubation of the 9,000 x *g* supernatants with an NADPH-generating system in the presence and absence of EDTA on ethylmorphine N-demethylase activity were studied. In the three rat livers with small amounts of lipid peroxidation, there was little difference in the activity of ethylmorphine N-demethylase in incubations carried out in the presence of EDTA (40-56 nmol formaldehyde formed/mg microsomal protein/15 min) or in the absence of EDTA (51-65 nmol/mg/15 min). In contrast, large differences in the activity toward ethylmorphine were seen when the supernatants from the two remaining rats were incubated with substrate in the absence of EDTA (19 and 10 nmol/mg/15 min) compared with the presence of EDTA (53 and 46 nmol/mg/15 min, resp.). The low amounts of lipid peroxidation in the first three rats are probably due to the inhibition of lipid peroxidation by factor(s) in the cytosol. The results suggest that factor(s) in the cytosol stabilize ethylmorphine N-demethylase activity by inhibiting lipid peroxidation.

6216 DYNAMICS OF LIVER GLYCOGEN: THE TOPOCHEMISTRY OF GLYCOGEN SYNTHESIS, GLYCOGEN CONTENT AND GLYCOGENOLYSIS UNDER THE EXPERIMENTAL CONDITIONS OF GLYCOGEN ACCUMULATION AND DEPLETION.

(Eng.) Sasse, D. (Lehrstuhl Anatomie III, Universitat Freiburg/Br., D-7800 Freiburg/Br., Albertstrasse 17, W. Germany). *Histochemistry* 45(3):237-254; 1975.

Using histochemical techniques, the glycogen content and the activities of glycogen synthetase (UDPGGT) and phosphorylase were studied in the livers of 106 golden hamsters under the following experimental conditions: starvation of 16, 36, 48, 72, and 96 hr; alloxan-diabetes of 24, 48, and 72 hr; and insulin-treatment (2 U, i.p.) after 24, 48, and 72 hr of alloxan-diabetes. Starvation led to a depletion of liver glycogen during the first 48 hr, which was finally restricted to zone 3 of the liver acinus. After starvation of 72 and 96 hr, a new glycogen accumulation was seen in the microvasculatory periphery of the acinus (zone 3 and 2). The process of glycogen depletion was characterized in the beginning by a high phosphorylase activity in all zones of the acinus, later only in the forefield of glycogen content. The weak activity of glycogen synthetase was mainly restricted to zone 3. All phases of glycogen depletion were found in alloxan-diabetic animals. Of 45 hamsters, 23 showed an extreme depletion of glycogen; typical for this situation was a weak or absent glycogen synthetase activity in zone 3 and a broad field of phosphorylase activity in zones 1 and 2. The short stimulation by insulin caused a considerable increase in glycogen synthetase activity at the portally oriented border of the glycogen area, and a shift of the moderate phosphorylase activity of zone 1 also occurred. The results indicate that a shift of the reduced glycogen content in the direction of the microvasculatory periphery of the liver acinus (zone 3) is caused by high phosphorylase activity in the portal forefield, and that glycogen synthetase activity is low in the glycogen area. After a short phase of glycogen synthesis in all hepatocytes, a moderate phosphorylase activity in zone 1 leads to a mobilization of the portal glycogen deposits and to an increasing accumulation of glycogen in the peripheral part of the acinus. At the portally oriented border of the glycogen area, a high synthetase activity leads to a broadening of the glycogen area in the direction of the portal branches. At the end of this process, the "normal" pattern of the liver acinus occurs. All hepatocytes are filled with glycogen; and the glycogen enzymes are restricted to the periportal border of zone 1.

6217 HETEROGENEITY OF HEPATIC VITAMIN B_{12} IN THE RAT AFTER PARENTERAL CYANOCOBALAMIN.

(Eng.) Cooksley, W. G. E.; Tavill, A. S. (MRC Clinical Res. Center, Harrow, Middlesex, England). *Clin. Sci. Mol. Med.* 49(3):257-264; 1975.

The rate of radioactive vitamin B_{12} excretion into plasma and bile from the isolated perfused Sprague-Dawley rat liver and into bile *in vivo* was measured after the i.m. injection of radioactive cyanocobalamin (15 pmol ^{57}Co-labeled cyanocobalamin or 240 pmol ^{58}Co-labelled cyanocobalamin) at short time intervals. The results were compared with those studies carried out after a longer time interval. After the shorter period of prelabeling (<7 days), there was a biphasic release of radioactive vitamin B_{12} by the isolated perfused liver over 4 hr: an initial rapid rate followed by a slower rate after about 1 hr of perfusion. The rates of total radioactive vitamin B_{12} excretion were 25% and 5% of the hepatic radioactivity into plasma and bile, resp., during the 4-hr perfusion of a liver labeled 18 hr previously. In contrast, the previous results showed that the long labeling period ($\geq$ 10 days) was associated with a linear release of radioactive vitamin B_{12}, and the total release into plasma and bile was decreased in comparison to the short labeling period (13.5% and 1% for plasma and bile, resp.). Confirmation of coexisting stable and labile pools of intrahepatic vitamin B_{12} was provided by: the patterns of hepatic release after double labeling with ^{57}Co-labeled and ^{58}Co-labeled cyanocobalamin at different times before liver perfusion and the rates of biliary excretion of ^{57}Co-labeled and ^{58}Co-labeled vitamin B_{12} *in vivo* after different periods of prelabeling. The rate and pattern of release were not altered by changes in the quantity of precursor cyanocobalamin (0.44, 1.1, and 44 nmol), by phenobarbitone (0.4 mmol/kg daily for 5 days) treatment, or by the addition of cycloheximide (10-18 μM) to the perfusion. The i.m. injection into rats of subcellular preparations of rat liver labeled *in vivo* with radioactive vitamin B_{12} demonstrated that hepatic heterogeneity did not depend on physical compartmentalization. Despite the rapid release from the liver of recently administered radioactive cyanocobalamin, the hepatic radioactivity increased progressively with time after labeling *in vivo*, in contrast to the other tissues, in which it decreased. In the presence of rapid bidirectional fluxes, the ability of the liver to store vitamin B_{12} can be largely explained by the reduction in the rate of hepatic release that continues for about 10 days after parenteral administration of cyanocobalamin.

6218 HEPATIC REGENERATION AND LYMPHOCYTE ACTIVITY.

(Eng.) Sakai, A.; Pfeffermann, R.; Mashimo, S.; Goldson, H.; Kountz, S. L. (Downstate Medical Center, Brooklyn, NY). *Surg. Forum* 26:406-408; 1975.

Two experiments were carried out to support the theory that lymphocyte activity is closely related to the liver function. The mean level of DNA synthesis in normal Lewis rat hepatocytes and lymphocytes, cultured with serum from rats that had undergone 70% hepatectomy, was significantly greater (12,740 counts per min in hepatocytes; 1,844 counts per min in lymphocytes) than that in hepatocytes and lymphocytes cultured in the sera of sham-operated rats (5,240 and 1,644 counts per min, resp.) or in normal sera (6,380 and 1,844 counts per min, resp.). In the second experiment, lethally irradiated (650 rads) Lewis rats were subjected to a 70% hepatectomy. The effect of the transfer of lymphocytes (1.5×10^8 cells, i.v.) taken from the spleens of normal rats or those with partial hepatectomy on the recovery of regeneration capacity was studied by counting the number of liver cells 10 days later. After partial hepatectomy alone, the mean number of liver cells was 20.79×10^6. In rats irradiated following partial hepatectomy, this number was only 8.20×10^6 cells. Total recovery of the regenerative capacity was achieved by the transfer of lymphocytes from the partially hepatectomized rats, the number of cells being 20.86×10^6. The number of cells after the transfer of normal lymphocytes was 14.64×10^6. The results suggest that partial hepatectomy increases the mitogenic serum factor, but does not decrease an inhibitor, and that a common pathway of the nucleic acid synthesis may be present in the regenerative hepatocytes and lymphocytes. These results, together with the fact that liver cells can be used in place of bone marrow cells to reconstitute lethally irradiated animals, indicate that there is a mutual pathway between the lymphocytes and liver cells.

6219 ROLE OF CHANGES IN PROTEIN DEGRADATION IN THE GROWTH OF REGENERATING LIVERS.

(Eng.) Scornik, O. A.; Bothol, V. (Dartmouth Medical Sch., Hanover, NH 03755). *J. Biol. Chem.* 251(10):2891-2897; 1976.

The significance of changes in rates of synthesis, export, and degradation of proteins during liver regeneration was assessed in male CD-1 mice. Proteins were pulse-labeled by the i.v. injection of radioactive leucine, and, 5 min later, by the injection of 0.4 mg pactamycin. One-half of the protein radioactivity was lost from the normal liver within 3 hr. From the radioactivity of the plasma proteins at that time and a study of the disappearance of these proteins from the circulation, it was calculated that 28% of the newly synthesized proteins were exported. Serum albumin accounted for a third of the exported proteins. Thirty-six hours after partial hepatectomy, the proportion of albumin to total protein synthesis remained constant, while that of the other plasma proteins increased by 50%. The fraction of the newly synthesized proteins retained by the liver after 3 hr decreased by 20%. During the first 36 hr of liver regeneration, the average rates of protein degradation slowed down to one-half the normal values. This was determined either by the loss of radioactivity from total protein (the guanidino-C of protein-bound arginine) in livers labeled with [^{14}C]bicarbonate, or calculated as the balance between protein synthesis and net protein gain. From these results, and those of a previous study of the protein synthetic machinery of normal and regenerating livers, it is concluded that changes in the rate of protein degradation are the single most important factor determining the increase in protein content during liver compensatory growth.

6220 THE CONTROL OF LIVER REGENERATION BY PARATHYROID HORMONE AND CALCIUM. (Eng.) Rixon, R. H.; Whitfield, J. F. (Natl. Res. Council Canada, Ottawa, Canada K1A 0R6). *J. Cell. Physiol.* 87(2):147-155; 1976.

The mechanism involved in proliferative incompetence, occurring when the liver is exposed to hypocalcemic conditions prior to partial hepatectomy, was studied in male, pathogen-free, Sprague-Dawley rats. Following 68% hepatectomy, there were two bursts of hepatocyte DNA-synthetic and mitotic activity that were produced by two subpopulations having different rates of (nearly synchronous) proliferative development. Only about 50% of the cells in both subpopulations could initiate DNA synthesis and enter mitosis when exposed to the hypocalcemic conditions in the parathyroprivic rat for 24 hr before partial hepatectomy. The proliferatively incompetent hepatocytes in these hypocalcemic rats were induced to initiate their DNA synthetic and mitotic activity by an i.p. injection of the calcium-mobilizing parathyroid hormone (50 USP U/100 g) as late as 12 hr after partial hepatectomy. Single i.p. injections of calcium (0.25 mg/100 g) also restored the proliferative competence of these hepatocytes, but only when injected at specific periods following partial hepatectomy. The injection of calcium, 12-15 hr after partial hepatectomy, induced hepatocytes in the first subpopulation to finish their development and enter mitosis, but did not affect the second, more slowly developing, subpopulation. Calcium had to be injected 25 hr after partial hepatectomy to stimulate proliferation in this second subpopulation. These data suggest that the hepatocytes that became proliferatively incompetent by prolonged exposure to a hypocalcemic environment are proliferatively activated by partial hepatectomy, but that their proliferative development stops at a calcium-dependent stage near the end of the prereplicative phase of development.

6221 DEGRADATION OF HEPATIC HAEM TO PORPHYRINS AND OXOPHLORINS IN RATS TREATED WITH 2-ALLYL-2-ISOPROPYLACETAMIDE. (Eng.) McDonagh, A. F.; Pospisil, R.; Meyer, U. A. (Dept. Medicine, Univ. California, San Francisco, CA 94143). *Biochem. Soc. Trans.* 4(2):297-298; 1976.

The destruction of the microsomal hemoprotein, cytochrome P-450, and loss of microsomal heme, which is accompanied by the formation of green-brown pigments known to be iron-free metabolites of the heme group of cytochrome P-450, was studied in Sprague-Dawley rats. Sodium phenobarbital (75 mg/kg, s.c.) was administered for 4 consecutive days before the administration of 2-allyl-2-isopropylacetamide (400 mg/kg). Chromatography revealed two major greenish-brown bands that fluoresced red (pigments 1 and 2). Four green bands (pigments 3-6) with a weak red fluorescence were also detected. Pigments 1 and 2 were identified as porphyrins by their absorption spectra. Pigments 3-6 were unstable and were recognized as oxophlorins by the changes in their acid titration spectra. Similarities in the spectra of porphyrins 1 and 2 and oxophlorins 3-6 indicated that these compounds may comprise two groups of isomers (1 and 2 isomeric, 3-6 isomeric). The spectra also indicated that all six pigments are substituted, probably in the 2 and 4 positions, with electron-withdrawing groups. The presence of oxophlorins among the "green pigments" suggests that free radicals may play a role in their formation. These studies show that the porphyrin ring is not opened when hepatic heme is degraded to "green pigments" in rats treated with 2-allyl-2-isopropylacetamide.

6222 PHOSPHOLIPID METABOLISM OF THE WHOLE LIVER, MITOCHONDRIA AND MICROSOMES DISTURBED BY ACUTE THIOACETAMIDE INTOXICATION, AND THE ACTION OF SILYMARIN. (Ger.) Schriewer, H.; Lohmann, J. (Physiologisch-Chemisches Institut, Westfalische Wilhelms-Universitat, 44 Munster/Westf., Waldeyerstr. 15, W. Germany). *Arzneim. Forsch.* 26(1):65-69; 1976.

The effect of thioacetamide (TAM) on lipid content and palmitate incorporation in hepatocyte organelle phospholipids and in whole liver and the effect of silymar (SYM) on hepatoprophylaxis are examined. Male Wistar rats received SYM (400 mg, i.p.) 60 min before the administration of TAM (300 mg/kg, i.p.). Labeled palmitate (PAL, 11.3 µCi/animal) was injected i.v. 20 minutes before sacrifice. TAM induced a statistically insignificant depression in the radioactivity of total lipids, total phospholipids, and phosphatidylcholine (PPC) and an increase in phosphatidylethanolamine (PEA). After SYM administration, the control levels were approximated. In liver homogenates, total lipid, triglyceride, and phospholipid increased. The reduction in specific mitochondrial PEA radioactivity by TAM was abolished by SYM, which was also prophylactic of TAM-induced changes in mitochondrial phospholipid concentrations. Microsomal phospholipid radioactivity was diminished by TAM, but only significantly for PEA; SYM is not prophylactic. SYM normalizes TAM-induced changes in microsomal phospholipid concentrations; PPC is elevated, and PEA diminished.

6223 EFFECT OF LYSINE ACETYLSALICYLATE ON BILIARY LIPID SECRETION IN DOGS.

(Eng.) Erlinger, S.; Bienfait, D.; Poupon, R.; Dumont, M.; Duval, M. (Hopital Beaujon, 92110 Clichy, France). *Clin. Sci. Mol. Med.* 49(3):253-256; 1975.

Because of the need for nonhepatotoxic drugs that reduce the cholesterol saturation of bile, the influence of i.v.-administered lysine acetylsalicylate on biliary lipid secretion was studied in four unanesthetized dogs with Thomas duodenal cannulae. Lysine acetylsalicylate (8.3 mmol, followed by a constant infusion of 0.2 mmol/min) increased bile flow from a mean control level of 0.14 ml/min to 0.45 ml/min, and erythritol clearance increased in parallel, from a mean control level of 0.24 ml/min to 0.63 ml/min. The bile salt secretion remained unchanged, suggesting that the compound stimulated the formation of the canalicular (hepatocytic) bile salt-independent fraction of bile flow. Lysine acetylsalicylate induced significant decreases in biliary phospholipid secretion from a mean control level of 2.9 µmol/min to 0.9 µmol/min and cholesterol secretion from a mean control level of 136 nmol/min to 5.9 nmol/min. The cholesterol saturation of bile was significantly reduced from a control level of 1.1 µmol/ml to 0.1 µmol/ml ($p<0.005$). It is postulated that the decrease in phospholipid and cholesterol secretion resulted from the dilution of intracanalicular bile salts. This effect of lysine acetylsalicylate, and possibly of other bile salt-independent choleretics, may be of value in the treatment of cholesterol gallstones in man.

6224 DIRECT EFFECTS OF VARIOUS CATECHOLAMINES ON LIVER CIRCULATION IN DOGS.

(Eng.) Hirsch, L. J.; Ayabe, T.; Glick, G. (Michael Reese Hosp., Chicago, IL 60616). *Am. J. Physiol.* 230(5):1394-1399; 1976.

Experiments were carried out in 25 dogs to elucidate the response of the splanchnic bed to various catecholamines, and attempts were made to define the roles of various receptors in these responses. As measured by electromagnetic blood flow transducers, the direct infusion of epinephrine (0.1 µg/kg/min), norepinephrine (0.1 µg/kg/min), and dopamine (2.0 µg/kg/min) into the portal vein (PV) produced a 40-50% decrease in hepatic arterial (HA) blood flow; isoproterenol (0.1 µg/kg/min) increased HA flow by about 69%. No changes in PV flow or pressure were observed. Direct HA infusion of the vasoconstrictors decreased HA flow by amounts comparable to those occurring after PV infusion. HA infusion of isoproterenol increased HA flow only 15% suggesting a difference in beta-receptor population in the two vessels. When infused directly into the superior mesenteric artery (SMA), epinephrine and norepinephrine reduced SMA flow by about 45% and PV flow by 20-25%; HA flow increased 6-8%. Infusion of isoproterenol and dopamine into SMA increased SMA flow by 115% and 206%, resp., and PV flow by 60% and 70%, resp. HA flow was decreased by 25% and 50%, resp. Portal vein pressure increased less than 3 mm Hg. Alpha- and beta-receptor blockade of the liver did not significantly change the alterations in hepatic arterial blood flow that were secondary to changes in portal venous blood flow. It is likely that regulation of hepatic arterial flow resides in mechanisms located within the liver sinusoids.

6225 CHLORAMPHENICOL-INDUCED GIANT HEPATIC MITOCHONDRIA.

(Eng.) Albring, M.; Radsak, K.; Thoenes, W. (Institut fur Cytobiologie und Cytopathologie, Universitat Marburg/Lahn, Marburg, W. Germany). *Naturwissenschaften* 62(1):43-44; 1975.

Since chloramphenicol has a selective inhibitory action on mitochondrial translation and has negligible effects on cytoplasmic synthetic processes, it was used in an investigation of the mechanism of development of giant hepatic mitochondria. Weanling mice were maintained on a diet containing 1.5% chloramphenicol-stearylglycolate for 10-13 days. All hepatocytes contained grossly enlarged mitochondria measuring 2-10 µm. Some of the organelles exhibited a striking reduction or complete loss of the inner membrane infoldings, whereas in others, cristae arranged in circular, looplike, or whorled patterns were observed. Megamitochondria were not thought to be produced by osmotic swelling, since the density of the matrix remained constant in organelles of different size within a given tissue section and was comparable to the density of control mitochondria in sections of essentially identical thickness. The results confirm the hypothesis that one mechanism for the development of giant mitochondria may be impairment of mitochondrial translation.

6226 THE ROLE OF MICROSOMAL HYDROXYLASES IN THE MODIFICATION OF CHLOROFORM HEPATOTOXICITY IN RATS.

(Eng.) Gopinath, C.; Ford, E. J. H. (Drug Safety Lab., Organon International, B.V. Oss, Netherlands). *Br. J. Exp. Pathol.* 56(5):412-422; 1975.

The relative activities of agents that alter the drug metabolism enzyme systems in the rat liver were compared using the following parameters: effects on hexobarbitone sleeping time (HST), effects on hepatic amidopyrine N-demethylase (MAD) activity, and the ability to modify chloroform toxicity. Male Wistar rats were used as they had greater mean MAD activity [6.0 g aminoantipyrine (AAP)/g/30 min] per unit weight liver, shorter HST (22.7 min), and were more susceptible to chloroform hepatotoxicity than females. Rats received one of the following treatments prior to the chloroform administration: phenobarbitone sodium (1 g/l in drinking water, 7 or 14 days), phenylbutazone (i.p., 5 days), chloropromazine (10 mg/kg/day x 7, i.p.), SKF 525A (50 mg/kg, i.p.), sodium diethyl dithiocarbamate (50 mg/kg, i.p.), carbon disulfide (0.5 ml/kg, p.o.), or *o,p*-chlorophenothane (DDT, 10 mg/kg, p.o.). All but the last group received chloroform at 0.75 ml/kg; those treated with phenobarbitone received 0.5 ml/kg. The livers of rats treated with phenobarbitone became pale and enlarged. There were large areas of coagulative necrosis, the smooth endoplasmic reticulum was severely swollen, and other organelles showed swelling or other signs of damage. The rats treated for 7 days had 47.9% necrotic and 6.9% degenerate cells; in comparison, the mean percentages in male control rats treated only with chloroform were 5.7% and 38.9%, resp. The mean HST and MAD were 12.5 min and 22.7 g AAP/g/30 min, resp., whereas these levels in chloroform-treated controls were 22.7 min and 6.0 g AAP/g/30 min, resp. In rats treated for 14 days, the values were 7.7 min and 52.1 g AAP/g/30 min, resp. Rats treated with phenylbutazone and chloroform had enlarged pale livers with accentuated lobulation. Centrilobular necrosis was present. The percentages of necrotic and degenerative cells were 30.4% and 7.5%, resp. HST and MAD were 10.0 min and 16.2 g AAP/g/30 min, resp. Of the six rats given chlorpromazine and chloroform, three had large necrotic areas around the central veins, surrounded by areas of degenerating cells. The percentages of necrotic and degenerate cells were 15.1% and 11.4%, resp. HST and MAD were 17.0 min and 5.4 g AAP/g/30 min. Rats that received sodium diethyl dithiocarbamate and chloroform showed no necrosis. HST was 36.2 min. In the rats given SKF 525A and chloroform, the percentages of necrotic and degenerating cells were 2.0% and 7.8%, resp. HST was 323.2 min. The rats receiving carbon disulfide showed no necrosis, but there was isolated cell degeneration (0.1%). The rats given DDT had HST and MAD values of 15.6 min and 34.5 g AAP/g/30 min. It is concluded that HST, MAD, and chloroform susceptibility are altered markedly by pretreatment with agents that alter the drug metabolizing enzyme system.

6227 INFLUENCE OF DOPAMINE ON THE PRESSURE IN THE HEPATIC VEIN.

(Ger.) Benko, H.; Peschl, L.; Schuller, J.; Neumayr, A. (Kaiserin-Elisabeth-Spital, Huglgasse 1, A-1150 Vienna, Austria). *Acta Med. Austriaca* 2(5):187-190; 1975.

Dopamine-induced changes in hepatic vein occlusion pressure were studied in 12 cirrhotic patients. The clinical sample included six men and six women, 35-70 yr of age; eight had ethanol cirrhosis, and four were postnecrotic. The patients received 3, 4, and 6 gamma/kg/min dopamine infusions; catheterization was via a cubital vein. Hepatic vein pressure was significantly ($p<0.005$) increased by 3 gamma; 4 and 6 gamma continued the elevation to 22% and 29%, resp., ($r=0.996$). There was no significant relation between initial hepatic vein pressure and dopamine elevation at any dose. The dopamine-induced effect is very short. The systolic pressure increased 2.5 mm Hg under 3 gamma. The mean arterial pressure rose 2, 8.5, and 14.5 mm Hg, resp., after 3, 4, and 6 gamma. The difference between the dopamine-induced effect at 6 and 3 gamma, and at 6 gamma and control levels, is significant ($p<0.005$). There was no significant correlation between changes in hepatic vein and arterial blood pressure. A dose of 3 gamma also elicited a significant increase in renal plasma flow and glomerular filtrate in cirrhosis. The 3 gamma dose is recommended for low-risk renal perfusion in cases of cirrhotic portal hypertension.

6228 ACETALDEHYDE LEVELS DURING ETHANOL OXIDATION: A DIET-INDUCED CHANGE AND ITS RELATION TO LIVER ALDEHYDE DEHYDROGENASE AND REDOX STATES.

(Eng.) Lindros, K. O.; Koivula, T.; Eriksson, C. J. P. (Res. Lab. State Alcohol Monopoly (Alko), Box 350, SF-00101 Helsinki 10, Finland). *Life Sci.* 17(10):1589-1597; 1975.

The effects of diet on ethanol elimination, blood acetaldehyde, and voluntary alcohol intake were investigated in female AA rats. The rats were given one of three diets for 2 weeks: A containing 34% protein and 3.6% fat, B containing 34% protein and 8% fat, and C containing 20% protein for 2 weeks. Each animal was given 1.5 g ethanol/kg body weight, i.p., and blood samples were taken and analyzed for ethanol and acetaldehyde. The animals were maintained on the diets for a further 7 weeks and were given free choice of 10% ethanol. Blood samples were taken again before and after administration of 1.5 g ethanol. Blood acetaldehyde levels were several times higher in rats maintained on diet A, even after only 2 weeks than in those maintained on diets B and C. The levels persisted 6 weeks later, when the rate of ethanol elimination was significantly faster in both the B ($p<0.01$) and C groups ($p<0.001$). Significant differences were found in levels of acetoacetate and acetaldehyde, both of which were significantly higher in the livers of diet A rats than in those on diet B ($p<0.001$ for acetoacetate and $p<0.001$ for acetaldehyde) or diet C ($p<0.01$ for acetoacetate and $p<0.05$ for acetaldehyde). The ethanol/acetaldehyde ratio in the liver was significantly lower in the rats on diet A than in the rats on diet B ($p<0.01$). The aldehyde dehydrogenase activity was significantly lower in the livers from rats fed on the A diet. The activity of the low-K_m enzyme with 0.12 mM acetaldehyde as substrate was about twice as high in livers from groups B and C. The results demonstrate that an unknown dietary factor causing a decreased activity of aldehyde dehydrogenase, especially of the low-K_m type, induces high liver and blood acetaldehyde concentrations during ethanol oxidation.

6229 CYCLIC AMP-LINKED MECHANISMS IN ETHANOL-INDUCED DERANGEMENTS OF METABOLISM IN RAT LIVER AND ADIPOSE TISSUE.

(Eng.) Jauhonen, V.

P.; Savolainen, M. J.; Hassinen, I. E. (Dept. Medical Biochemistry, Univ. Oulu, SF-90220 Oulu 22, Finland). *Biochem. Pharmacol.* 24(20):1879-1883; 1975.

To study the effects of ethanol on cyclic AMP (cAMP)-linked mechanisms *in vivo*, an acute ethanol load was induced by gastric administration of ethanol (5 g/kg) to fasted male Long-Evans rats. The concentrations of cAMP during the following 24 hr, measured in the liver and adipose tissue, were correlated with simultaneously measured concentrations of blood glucose, plasma free fatty acids (FFA), hepatic triglycerides (TG), hepatic glycogen, and blood ethanol. Ethanol induced a significant increase in hepatic cAMP, reaching a maximum at 16 hr after administration. Hepatic glycogen decreased 15-fold after 6 hr, and blood glucose decreased slightly. Plasma FFA levels decreased significantly, with a minimum at 4 hr. Hepatic TG levels increased steadily from 6 to 24 hr after the ethanol administration, reaching about a fivefold increase at 24 hr. An unexpected small decrease in adipose tissue cAMP was observed. In neither hepatic nor adipose tissue did the cAMP concentration correlate with the blood ethanol concentration. It is concluded that the changes in cAMP are more likely to be due to the regulation of blood glucose than to an unspecific stress response. Experiments with isolated perfused rat livers have demonstrated that ethanol has no direct effect on the metabolism of hepatic cAMP.

6230 COMPARISON OF HEPATIC TRIGLYCERIDE CONTENT AND HEPATIC LIPID SECRETION AFTER VARIOUS DOSES OF ETHANOL.

(Eng.) Estler, C. J. (Dept. Pharmacology, Univ. Erlangen-Nurnberg, Erlangen, W. Germany). *Biochem. Pharmacol.* 24(20):1871-1873; 1975.

To investigate the importance of hepatic lipid release in the development of acute alcoholic fatty liver, the effect of ethanol (1, 2, and 4 mg/g, i.v.) on hepatic triglyceride content, hepatic lipid release, and plasma esterified fatty acid levels was studied in female NMRI mice. Within 4-8 hr, all doses of ethanol increased the triglyceride content of the liver to about the same degree. Lipid secretion from the liver was inhibited 2 hr after the administration of 4 mg/g ethanol and increased 8 hr after the injection of 2 and 4 mg/g ethanol. Plasma esterified fatty acids showed an initial increase after 1 mg/g and an initial decrease after 4 mg/g ethanol. Eight hr after the administration of 4 mg/g ethanol, the level of esterified fatty acids in the plasma was increased. Two mg/g ethanol had no effect on plasma esterified fatty acid levels. From the absence of a clear correlation of the three parameters tested, it is concluded that inhibition of lipid secretion from the liver is not a major reason for the development of acute alcoholic fatty liver in mice.

6231 EFFECT OF LONG-TERM ADMINISTRATION OF ETHANOL TO THE RAT: LIPIDS, COLLAGEN AND OTHER PROTEINS, AND MALLORY BODIES IN THE LIVER.

(Eng.) Hakkinen, H.-M.; Franssila, K.; Kulonen, E. (Res. Lab., State Alcohol Monopoly [Alko], Box 350, SF-00101 Helsinki 10, Finland). *Scand. J. Gastroenterol.* 10(8):753-765; 1975.

The effects of long-term ethanol administration and different diet combinations on the growth and liver histology of 6-week-old male Wistar rats were investigated. A control group of 15 rats, who received normal laboratory food and water, showed a mass gain of 4.49 ± 0.23 g/day during their rapid growth period (days 0-39), compared with a gain of 2.78 ± 0.30 g/day for 14 rats on a normal diet who received ethanol (1.20 g/100 g) in their drinking water. A mass gain of 1.85 ± 0.26 g/day was observed in nine rats on a normal diet who received ethanol in the drinking water plus 500 mg/100 g ethanol 3 times/week by stomach tube. Mass gains of 0.80 ± 0.08 g/day were observed in 15 rats receiving a high fat and low protein diet with no ethanol. Fourteen rats on the same diet, but with ethanol in the drinking water experienced a 0.7 ± 0.10 g/day weight gain. The mass gain for 10 rats on a normal diet who received 75 μl carbon tetrachloride/100 g by s.c. injection twice/week was 3.15 ± 0.52 g/day. Histologically, all five rats on a normal diet with ethanol in the drinking water showed mallory bodies in the liver 10 weeks after tratment, and two of three rats on a normal diet who received both voluntary and forced ethanol showed mallory bodies 8 weeks after treatment. Focal and septal inflammation were observed in all seven rats on a high fat, low protein diet without alcohol after 5 and 8 weeks, resp., and in all eight rats on the same diet with ethanol in the drinking water after 4 and 10 weeks, resp. Septal inflammation was observed 8 weeks after treatment in four of five rats receiving carbon tetrachloride (normal diet). Liver fibrosis and cirrhosis were seen in all six rats on a high fat, low protein diet (no ethanol) 10 and 8 weeks, resp., after treatment and in all five rats on the same diet with alcohol in the drinking water after 10 and 16 weeks, resp. Liver cirrhosis was observed 8 weeks after treatment in four of five rats receiving carbon tetrachloride (normal diet). Although both ethanol and the high fat, low protein diet resulted in the development of liver injury, the effects of ethanol in rats receiving the high fat, low protein diet were not enhanced over those observed in rats on a normal diet.

6232 EFFECT OF GLUCOSE ADMINISTRATION ON CHOLESTEROL AND BILE ACID METABOLISM IN RATS.

(Eng.) Uchida, K.; Takeuchi, N.; Yamamura, Y. (Shionogi Res. Lab., Shionogi & Co., Ltd., Fukushima-ku, Osaka 553, Japan). *Lipids* 10(8):473-477; 1975.

Hepatic cholesterogenesis, cholesterol 7α-hydroxylase activity, bile secretion, biliary excretion rates of cholesterol and bile acids, and their compositions were investigated in male Wistar rats given a 50% glucose solution (2 ml/100 g) by stomach tube after fasting for 36-40 hr. Although bile volume was not influenced by glucose administration, the mean biliary excretion of total bile acids increased from a control level of 2.73 mg/hr/100 g to 4.08 mg/hr/100 g ($p<0.05$) 3 hr after glucose administration At this time, the mean rate of hepatic cholesterogenesis (14.88 nmol/hr/g tissue) and cholesterol 7α-hydroxylation (0.93 nmol/hr/mg protein) were also significantly increased over control levels (5.52 nmol/hr/g and 0.36 nmol/hr/mg, resp.) The biliary excretion rate of cholesterol was increased from a mean level of 97 μg/hr/100 g at 0 hr to 119 μg/hr/100 g at 3 hr ($p<0.05$) and 128 μg/hr/100 g at 5 hr ($p<0.05$). The excretion of total bile acids gradually increased from a mean level of 3.20 mg/hr/100 g at 0 hr to 5.16 mg/hr/100 g at 5 hr ($p<0.05$). Gas chromatography of bile acid fractions from fasted controls and glucose-treated rats revealed that the main constituent of biliary bile acid was cholic acid, which comprised 42% in controls and 38% in treated rats. Deoxycholic acid was a minor component in controls, but was increased to about 30% in glucose-treated animals. The excretion of deoxycholic acid in nonfasted, untreated rats was as low as 0.32 mg/hr/100 g, but was almost doubled by fasting (0.69 mg/hr/100 g), and further increased by glucose administration. The highest values were obtained at 1 and 2 hr (1.19 and 1.18 mg/hr/100 g, resp.; $p<0.05$), after which the values decreased gradually to 0.83 mg/hr/100 g at 5 hr. Pretreatment with neomycin (25 mg/100 g daily for 3 consecutive days) abolished the increase in deoxycholic acid by fasting and glucose administration. Other bile acid components showed no significant change. It is presumed that cholesterol endogenously synthesized in the liver is metabolized mainly to cholic acid; in contrast, exogenous cholesterol is metabolized mainly to chenodeoxycholic acid. During the period of the acute enhancement of cholic acid formation from the endogenous cholesterol, biliary excretion of deoxycholic acid was increased. This probably occurs through the depression of 7α-rehydroxylation of deoxycholic acid or through the enhancement of microbial formation of deoxycholic acid in the lumen and through the increase of intestinal absorption.

6233 EFFECT OF ACUTE CHOLESTASIS ON HEPATIC CIRCULATION.

(Eng.) Szabo, G.; Jakab, F.; Magyar, Z. (Natl. Inst. Traumatol., H-1430 Budapest, Mezo Imre ut 17, Hungary). *Acta Med. Acad. Sci. Hung.* 31(3/4):229-239; 1974.

The effect of acute cholestasis on hepatic circulation was studied in 10 mongrel dogs. In each dog, a small mesenteric vein was cannulated with a fine polyethylene catheter whose tip was passed into the portal vein. The cystic duct was ligated, and the common duct was transected and cannulated with a teflon tube. Electromagnetic flow probes were placed on the common hepatic artery and portal vein and were connected to a flow meter. Portal venous and femoral arterial pressures were measured with strain gauges. Control measurements were taken 1 hr after surgery, and the common duct was occluded by connecting the end of the cannula directly to a pressure transducer. Hemodynamic parameters were estimated every 30 min for 6 hr. The common duct was not occluded in three controls. In all dogs, the mean control value for hepatic artery flow was 177 ± 27 ml/min, and for portal vein flow, 439 ± 80 ml/min. The hepatic artery contributed 29% and the portal vein 71% to the total blood flow. Pressure in the common duct was 5.6 ± 0.7 mm Hg before cannulation. After occlusion, pressure rose to 20 mm Hg in 1-1.5 hr. This was followed by an increase in hepatic artery flow, attaining a maximum 95% increase in 2.5-3 hr, accompanied by a slow decrease of portal vein flow to about 50%. Total hepatic blood flow was decreased substantially in the last half hour of the experiment (-13%, $p>20\%$). There was a substantial increase in total portal resistance from 1.75 ± 0.40 peripheral resistance units (PRU) to 6.06 ± 2.73 PRU, while arterial pressure decreased from 51 ± 16 to 26 ± 5 PRU. After 5 hr, the hepatic artery and portal vein flow values were 60% and 40%, resp. There was a significant correlation between the increase in common duct pressure and the changes of arterial and portal vein blood flows ($p<0.1\%$). The relationship between bile duct pressure and blood flow was not linear. There was also no linear correlation between portal blood flow or resistance and arterial flow or resistance; a complex relationship existed. It is concluded that occlusion of the common duct causes a marked increase in hepatic artery flow, reduction of portal vein flow, and little change in total hepatic blood flow.

6234 JAUNDICE AND WOUND HEALING: AN EXPERIMENTAL STUDY.

(Eng.) Bayer, I.; Ellis, H. (Westminster Hosp., London, England). *Br. J. Surg.* 63(5):392-396; 1976.

The effects of obstructive jaundice on the healing of abdominal wounds, gastric incisions, and parietal peritoneal defects were studied in 140 female Sprague-Dawley rats. Obstructive jaundice was induced by ligation and division of the common bile duct. The healing of a standard gastric incision and a parietal peritoneal defect in these animals showed delayed healing compared with controls. There was no significant increase in the mean bursting strength of the abdominal wound in the jaundiced animals between the second and eighth days of wound healing; the strength ranged between 17.90 and 21.20 mm Hg. The bursting strength in controls was significantly higher at days 4 (21.30 mm Hg) and 6 (22.90 mm Hg), and then showed a steep rise between the sixth and eighth days (37.20 mm Hg on day 8). The bursting strength of the gastric incision showed a rapid increase from the fourth to the eighth day in both groups, with no significant difference between the groups. In the controls, the peritoneal defects on the fourth day demonstrated proliferating fibroblasts with commencing collagen deposition. By the eighth day, dense collagen fibers were obvious, had oriented parallel to the surface of the wound, and were interspersed with well-developed and flattened fibroblasts. In the jaundiced rats, the peritoneal defects demonstrated a delay of 48-72 hr in their healing process, so that at 8 days, there was still a considerable cellular exudate containing young fibroblasts with minimal collagen formation. In the jaundiced rats at 8 days, the gastric wound demonstrated granulation tissue in a loose stroma, with necrotic tissue still present and only early fibroblast proliferation, demonstrating considerable histological delay in the healing process. Angiography revealed a delay in angiogenesis in the gastric wounds of the jaundiced animals. It appears that bilirubin or some other substance in retained bile has a profound inhibitory effect on fibroplasia and angiogenesis.

6235 AN ATTEMPT TO INDUCE PORTAL HYPERTENSION AND ESOPHAGEAL VARICES IN THE RAT. (Eng.) Saku, M.; Borjesson, B.; Olin, T.; Bengmark, S. (Dept. Surg., Univ. Lund, S-221 85 Lund, Sweden). *Eur. Surg. Res.* 8(2):166-173; 1976.

Attempts were made to experimentally induce portal hypertension in male Sprague-Dawley rats using Ameroid constrictors and shunt operations. One week after the application of the Ameroid constrictor around the portal trunk, it was completely occluded; portal venous pressure was elevated to 21-27 mm Hg. Angiographically, the splenorenal collaterals and collaterals overbridging the Ameroid constrictor were observed in all examined rats. However, esophageal varices were not found in any rat. In another group of rats, an end-to-side cavoportal shunt was created before the application of the Ameroid constrictor. This operation model was devised to increase the portal venous flow and to inhibit the development of splenorenal collaterals. As expected, collaterals to the superior vena cava system developed instead. However, the collaterals occurred retroperitoneally, not in the esophageal wall.

6236 OXIDATIVE PHOSPHORYLATION IN RAT LIVER MITOCHONDRIA UPON ALIMENTARY COPPER DEFICIENCY AND COPPER LOADING. (Eng.) Kassabova, T. A.; Balevska, P. S.; Roussanov, E. M. (Inst. Physiology, Bulgarian Acad. Science, Sofia, Bulgaria). *Dokl. Bolg. Akad. Nauk* 29(1):117-119; 1976.

The electron transport and oxidative phosphorylation of mitochondria isolated from the livers of Wistar rats were studied during dietary copper deficiency and during copper loading. Copper deficiency was induced by feeding a low-copper diet (powdered milk and redistilled water) for 30 days. Copper loading was produced by feeding a standard diet supplemented with copper sulphate (40 mg/rat/day) for 6 weeks. The copper content in the mitochondria of controls was 0.51 x 10^{-9} M copper/mg protein, while that in the copper-deficient animals was 0.27 x 10^{-9} M and that in the copper-loaded animals was 1.52 x 10^{-9} M. The cytochrome *c* content in copper-loaded animals (0.20 mμM/mg protein) was decreased in comparison to that in controls (0.24 mμM/mg). The cytochrome *c* content in copper-deficient animals was still lower (0.17 mμM/mg). The activity of cytochrome oxidase in copper-loaded animals (1,230 mμAO/min/mg) and in copper-deficient animals (870 mμAO/min/mg) was lower than that in controls (1,480 mμAO/min/mg). During copper deficiency, the liver mitochondria had a lower oxygen uptake in State 3 during the oxidation of all substrates (ascorbate + TMPD, 72.3 mμAO/min/mg; succinate, 107.1 mμAO/min/mg; glutamate + malate, 89.4 mμAO/min/mg; β-hydroxybutyrate, 67.7 mμAO/min/mg) than in controls (92.2, 142.2, 110.6, and 80.4 mμAO/min/mg). The oxygen uptake in state 4 showed no decrease in the oxidation of glutamate-malate, β-hydroxybutyrate, and succinate. The respiratory control index and the ADP:O ratio at the oxidation of these substrates were also lower. This indicates that, in addition to a defect in the electron transport, these mitochondria are characterized by uncoupling, which is probably due to changes in the membrane composition.

6237 EFFECT OF ACETAMINOPHEN-INDUCED HEPATOTOXICITY ON THE METABOLISM AND BILIARY EXCRETION OF [^{35}S]BROMOSULFOPHTHALEIN. (Eng.) Buttar, H. S. (Health Protection Branch, Health and Welfare Canada, Ottawa, Canada). *Toxicol. Appl. Pharmacol.* 33(1):129-130; 1975.

6238 INITIAL STUDIES ON THE EFFECTS OF THE GROWTH FACTOR PRODUCED BY PLEROCERCOIDS OF THE TAPEWORM, Spirometra mansonoides, ON LIVER DRUG METABOLISM. (Eng.) Cook, D. E.; Phares, C. K. (Univ. Nebraska Medical Center, Omaha, NB 68105). *Biochem. Pharmacol.* 24(20):1919-1922; 1975.

6239 INHIBITION OF CHOLESTEROL BIOSYNTHESIS BY CHENODEOXYCHOLIC ACID IN THE RHESUS MONKEY. (Eng.) Shefer, S.; Salen, G.; Fedorowski, T.; Dyrszka, H.; Mosbach, E. H. (Public Health Res. Inst., New York, NY 10016). *J. Steroid Biochem.* 6(11/12):1563-1564; 1975.

6240 EFFECT OF TRYPTOPHAN ON HEPATIC POLYRIBOSOMAL DISAGGREGATION DUE TO HYPERTONIC SODIUM CHLORIDE. (Eng.) Sidransky, H.; Verney, E.; Murty, C. N. (Univ. South Florida Coll. Medicine, Tampa, FL 33620). *Lab. Invest.* 34(3):291-297; 1976.

6241 CATECHOLAMINE METABOLISM AND LIVER DYSFUNCTION DURING INDUCTION OF ETHANOL DEPENDENCE [Abstract]. (Eng.) Abu-Murad, C.; Griffiths, P. J.; Littleton, J. M. (King's Coll., London, England). *Br. J. Pharmacol.* 56(3):377P-378P; 1975.

6242 EFFECT OF PANTOTHENIC ACID DEFICIENCY ON MICROSOMAL LIPIDS OF RAT LIVER. (Eng.) Mahboob, S. (Sch. Medicine, Univ. Pittsburgh, Pittsburgh, PA 15261). *Nutr. Metabol.* 19(1/2):91-95; 1975.

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6244 LIPOLYSOME--A LYSOSOME IN THE FLOATING LAYER OF NORMAL RAT LIVER [Abstract]. (Eng.) Hayashi, H.; Winship, D. H. (Univ. Missouri Sch. Medicine, Columbia, MO). *Clin. Res.* 24(3): 286A; 1976.

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6246 PRELIMINARY CHARACTERIZATION OF ENZYMES FOR REDUCTION OF NALOXONE AND NALTREXONE IN RABBIT AND CHICKEN LIVER. (Eng.) Roerig, S.; Fujimoto, J. M.; Wang, R. I. H.; Pollock, S. H.; Lange, D. (Medical Coll. Wisconsin, 561 N. 15th St., Milwaukee, WI 53233). *Drug Metab. Dispos.* 4(1):53-58; 1976.

6247 THE METABOLISM OF L-ETHIONINE IN RATS FED α-NAPHTHYL ISOTHIOCYANATE. (Eng.) Brada, Z.; Bulba, S. (Papanicolaou Cancer Res. Inst., Miami, FL 33136). *Res. Commun. Chem. Pathol. Pharmacol.* 13(1):19-26; 1976.

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6250 ABNORMAL CEREBROVASCULAR RESPONSE TO ALTERED $PaCO_2$ IN BABOONS WITH OBSTRUCTIVE JAUNDICE. (Eng.) McCaldern, T. A.; Eidelman, B. H.; Bloom, D. (Dept. Physiology, Univ. Witwatersrand, Johannesburg, South Africa). *Stroke* 7(2): 190-193; 1976.

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6255 ELECTRON MICROSCOPY OF LYMPHOCYTES AND HEPATOCYTES IN ORTHOTOPIC LIVER HOMOGRAFTS DURING THE LATE REJECTION (TARGET CELL DESTRUCTION BY LYMPHOCYTES IN VIVO?). (Eng.) Cossel, L. (Inst. Pathology, Karl-Marx-Univ., DDR-701 Liepzig, Liebigstrasse 26, Germany). *Exp. Pathol. (Jena)* 11(5/6): 255-269; 1975.

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See also, 6132, 6180, 6287, 6293, 6294.

SECRETION AND METABOLISM

Intestine

6259 APOPROTEIN B IN FASTING AND POSTPRANDIAL HUMAN JEJUNAL MUCOSA. (Eng.) Rachmilewitz, D.; Albers, J. J.; Saunders, D. R. (Dept. Medicine, Univ. Washington, Seattle, WA 98195). *J. Clin. Invest.* 57(2):530-533; 1976.

Experiments were conducted to determine whether apoprotein B is present in fasting and postprandial human duodenojejunal mucosa. Duodenojejunal biopsies from 30 normal volunteers were incubated in citrate buffer and were shaken in 1% EDTA to free the absorptive cells from underlying tissue. Apoprotein B was determined by double-antibody radioimmunoassay in homogenates of absorptive cells. The preparations of absorptive cells were uncontaminated with plasma lipoproteins. They adsorbed less than 0.1% of ^{125}I-low density lipoprotein, which was added to the citrate buffer. Cell preparations from suction biopsies of human rectum contained no detectable apoprotein B. Duodenojejunal absorptive cells from 22 fasting subjects contained 3.2 ± 0.5 μg/100 mg apoprotein B (wet weight) or 1.3 ± 0.3 μg apoprotein B per total cell protein. The amount of apoprotein B per milligram of cell protein fell to 0.3 ± 0.1 μg in 14 subjects whose mucosa was also sampled 45 min after intraduodenal fat instillation. These experiments provide immunochemical evidence that human duodenojejunal absorptive cells contain apoprotein B. This technique should be valuable for studying the physiology of intestinal lipoproteins in absorption and in patients with hyperlipidemia.

6260 TRIACYLGLYCEROL BIOSYNTHESIS IN EVERTED SACS OF RAT INTESTINAL MUCOSA. (Eng.) Breckenridge, W. C.; Kuksis, A. (Toronto-McMaster Lipid Res. Clinic, Univ. Toronto, Toronto, Ontario, Canada). *Can. J. Biochem.* 53(11):1184-1195; 1975.

The molecular specificity of the biosynthesis of triacylglycerols by rat intestinal mucosa was examined using radioactive and mass tracers, thin-layer chromatography with silver nitrate, and gas-liquid chromatography with radioactivity monitoring. Bile salt micelles of alternately labeled monoacylglycerols and free fatty acids were incubated with everted sacs of intestinal mucosa for various periods of time, and the triacylglycerols were isolated by solvent extraction and thin-layer chromatography. Analyses of the molecular species of the triacylglycerols labeled from monoacylglycerols showed that the 2-monoacylglycerol pathway was responsible for the biosynthesis of a maximum of 90%, and the *X*-1-monoacylglycerol pathway for about 10% of the total radioactive triacylglycerols. Analyses of the molecular species of triacylglycerols labeled from free fatty acids showed that the phosphatidic acid pathway contributed a minimum of 20-30% of the total labeled triacylglycerol formed. There was a preferential utilization in triacylglycerol biosynthesis of the more unsaturated diacylglycerols arising from the monoacylglycerol pathway and of the more saturated diacylglycerols originating from the phosphatidic acid pathway. The experiments do not allow a demonstration of the utilization of the *sn*-2,3-diacylglycerols in triacylglycerol biosynthesis, but are not inconsistent with it.

6261 ORGANIZATION OF POLYSUBSTRATE PROCESSES ON THE SURFACE OF THE SMALL INTESTINE: PHYSIOLOGICAL AND CLINICAL FINDINGS. (Cze.) Ugolev, A. M.; Gredin, V. G.; Gruzdkov, A. A.; De Laey, P.; Egorova, V. V.; Iezuitova, N. N.; Kolotushkina, A. A.; Timofeeva, N. M.; Tuliaganova, E. Kh.; Tsvetkova, V. A.; Cherniakhovska, M. Yu.; Shcherbakov, G. G. (I. P. Pavlov Inst. Physiology, Leningrad, USSR). *Cesk. Gastroenterol. Vyz.* 28(2):110-121; 1974.

The interaction of the basic groups of nutrients during intestinal absorption and the mechanism and physiological significance of absorption were studied in adult and young rats and adult rabbits, cats, and chickens. Everted sections of the small intestine (excluding the duodenum), tissue homogenates of the small intestinal mucosa and the renal cortex, and solubilized and purified enzymes were used to analyze the hydrolysis of glycyl-L-leucine, glycyl-L-tyrosine, triglycerides, sucrose, maltose, soluble starch, and sodium β-glycerophosphate. Absorption was characterized by the simultaneous processing of different nutrient substrates, and the processes of the polysubstrate digestion interacted in an organized manner. Many of the participating enzymes were allosteric, and enzymes of the same name had different regulatory characteristics in different animal species, in different organs of the same animal, and in the same animal at different periods in the life cycle. The existence of not only catalytic but also regulatory hydrolytic enzymes, and the significance of nutrients not only as substrates but also as modifiers of digestive processes are of practical importance for the understanding and correction of nutritional problems and small intestinal pathology.

6262 EFFECTS OF CHOLERA TOXIN ON ADENYLATE CYCLASE: STUDIES WITH GUANYLYLIMIDODIPHOSPHATE. (Eng.) Flores, J.; Sharp, G. W. G. (Massachusetts General Hosp., Boston, MA 02114). *J. Clin. Invest.* 56(5):1345-1349; 1975.

The effects of cholera toxin and guanylylimidodiphosphate (GIDP) on adenylate cyclase activity were studied in the rat liver. Rats were injected with cholera toxin (1 μg/g, i.v.), and 5 hr later, their livers were perfused through the portal vein with a Tris-HCl buffer. Homogenates from untreated livers were incubated with 4 μg/ml cholera toxin and 1 mM NAD for 15 min. The adenylate cyclase activity in the controls and in *in vivo* and *in vitro* treated homogenates was determined in the presence and absence of GIDP (0-10^{-3} M). In other experiments, homogenates from untreated rats were preincubated with GIDP, and adenylate cyclase was assayed before and after the addition of cholera toxin. In the control preparations, maximal adenylate cyclase stimulation was seen with 10^{-4} M GIDP. Treatment with cholera toxin alone *in vivo* resulted in a sevenfold activation of basal adenylate cyclase. Prior activation of adenylate cyclase by cholera toxin *in vivo* or by cholera toxin and NAD in the homogenates blocked the stimulatory effect of GIDP. Under conditions in which the effect of GIDP was less than that of cholera toxin, inhibition of stimulation by toxin was seen. Stimulation of adenylate cyclase by maximal concentrations of GIDP, but not by submaximal concentrations, blocked the stimulatory effect of cholera toxin. The mutual interference of the actions of these two agents suggests a common target in the regulatory mechanism of the adenylate cyclase complex.

SECRETION AND METABOLISM

6263 EFFECT OF ANTRECTOMY ON ILEAL HYPERPLASIA AFTER JEJUNECTOMY IN THE RAT [Abstract]. (Eng.) Hughes, W.; Tawil, T.; Weser, E. (Univ. Texas Health Science Center, San Antonio, TX). *Clin. Res.* 24(3):286A; 1976.

6264 CECAL AND COLONIC CALCIUM (Ca) SECRETION IN DIETARY MAGNESIUM (Mg) DEFICIENCY: IN VIVO STUDIES IN THE RAT [Abstract]. (Eng.) Petith, M. M.; Schedl, H. P. (Dept. Medicine, Univ. Iowa, Iowa City, IA 52242). *Fed. Proc.* 35(3):500; 1976.

6265 SECRETION OF WATER IN THE RAT JEJUNUM DUE TO FOLATE DEFICIENCY OF THE INTESTINAL MUCOSA [Abstract]. (Eng.) Goetsch, C. A.; Klipstein, F. A. (Univ. Rochester Sch. Medicine, New York, NY). *Clin. Res.* 24(3):285A; 1976.

6266 GLUTATHIONE S-TRANSFERASES AS A DETOXICATION SYSTEM OF THE SMALL INTESTINE [Abstract]. (Eng.) Ketley, J. N.; Pinkus, L. M. (Natl. Inst. Arthritis, Metabolism and Digestive Diseases, NIH, Bethesda, MD 20014). *Fed. Proc.* 35(7):1421; 1976.

6267 LITHIUM INHIBITS INTESTINAL ION SECRETION [Abstract]. (Eng.) Dobbins, J.; Binder, H. J. (Yale Univ., New Haven, CT). *Clin. Res.* 24(3): 283A; 1976.

6268 THE EFFECTS OF PREDNISOLONE ON THE FUNCTION, BIOCHEMISTRY AND STRUCTURE OF THE RAT SMALL INTESTINAL MUCOSA [Abstract]. (Eng.) Batt, R. M.; Peters, T. J. (Royal Postgraduate Medical Sch., Du Cane Rd., London, England). *Gut* 16(10):826; 1975.

6269 INTESTINAL ABSORPTION OF LEUCINE FROM DI, TRI AND TETRAPEPTIDES IN RATS [Abstract]. (Eng.) Chung, Y. C.; Silk, D. B. A.; Kim, Y. S. (Veterans Admin. Hosp., San Francisco, CA). *Clin. Res.* 24(3):282A; 1976.

6270 DISSOCIATION OF RAT INTESTINAL MALTASE-GLUCOAMYLASE [Abstract]. (Eng.) Flanagan, P. R.; Forstner, G. G. (Hosp. Sick Children, Toronto, Canada M5G 1X8). *Fed. Proc.* 35(3):284; 1976.

6271 RESORPTION AND SECRETION STUDIES ON ISCHEMIC SMALL INTESTINE OF THE DOG [Abstract]. (Ger.) Frauchiger, J. P. (Klinik fur viszerale Chirurgie, Inselspital, CH-3010 Berne, Switzerland). *Helv. Chir. Acta* 42(1/2):101; 1975.

See also, 6274, 6292, 6297, 6302, 6904.

GENERAL

6272 SUBEPITHELIAL CAPILLARY BLOOD FLOW ESTIMATED FROM BLOOD-TO-LUMEN FLUX OF BARBITAL IN ILEUM OF RATS. (Eng.) Csaky, T. Z.; Varga, F. (Univ. Kentucky, Coll. Medicine, Lexington, KY 40506). *Am. J. Physiol.* 229(3):549-552; 1975.

The outflux of ^{14}C-labeled barbital (diethyl barbituric acid) from the blood into the small intestine of Sprague-Dawley rats was measured to determine the subepithelial capillary blood flow in the gut. The small intestine had been perfused with an isosmotic buffer of pH 9.5. Barbital clearance was blood flow-limited when the total blood flow to the small intestine varied between 0.3 and 1.3 ml/min/g wet gut. The barbital clearance amounted to an average of 50.3% of the total blood flow. The total mucosal blood flow, determined by the use of the distribution of microspheres in the layers of gut wall, was 62.76% of the total blood flow. It is concluded that, for anatomical reasons, the subepithelial blood flow available for the transport process is somewhat less than the measured total mucosal blood flow.

6273 EFFECTS OF IRRADIATION ON THE RELEASE AND RETENTION OF LABELLED DNA IN THE SMALL INTESTINE OF MICE. (Eng.) Suciu, D.; Uray, Z.; Abraham, A. D. (Oncological Inst. Biological Res. Centre, luj-Napoca, Rumania). *Strahlentherapie* 150(2):149-153; 1975.

As an extension of studies on the effects of irradiation on the DNA content of the small intestine, male A2G mice were whole-body irradiated with 300, 500, and 800 rads (^{60}Co) at 1 hr and 3 days after receiving an injection of ^{3}H-thymidine (25 μCi, i.p.). The time courses of the total and specific activity of DNA indicated that 3 days after exposure to 500 and 800 rads, the mitotically active cells were selectively lost from the small intestine. The cells that were labeled 1-3 days before exposure were less sensitive to radiation than the cells irradiated 1 hr after the administration of thymidine. The data support the conclusion that the dividing cell population in the small intestine is more radiosensitive than the fraction of functional cells. As the cells migrate from the crypts to the tips of the villi, they lose their proliferative capacity and become more radioresistant.

6274 ELECTROPHORETIC AND IMMUNOCHEMICAL EXAMINATION OF PROTEINS AND SOME ENZYMES OF RAT SMALL INTESTINAL MUCOSA IN THE INTESTINAL TYPE OF RADIATION SICKNESS. (Ger.) Sareckij, A. N.; Kaskin, K. P.; Surinov, B. P. (Res. Inst. Medical Radiology, Obninsk, USSR). *Radiobiol. Radiother. (Berl.)* 15(3):404-417; 1974.

The composition and concentration of small bowel mucosa proteins and enzymes after radiation trauma was explored in male August rats. The microsomes, mitochondria, and hyaloplasma fractions of rat mucosal sections were harvested 6, 12, 24, 48, and 72 hr after whole body ^{60}Co gamma irradiation (total dose, 1,000 R). Electrophoresis found the total protein concentration to be reduced 24 hr after exposure. Some lipoprotein fractions increased, but at a slower rate than the decrease in glycoprotein fractions. A few of the glycoprotein fractions in the deoxycholate extracts went to extinction, probably due to increased lysosomal hydrolase activity. A significant increase in total acid phosphatase activity occurred at 24-72 hr, due to isoenzyme formation. Total aspartic aminotransferase fell gradually, especially the mitochondrial isoenzyme. At 48 hr, the tissue-specific esterase disappeared, corresponding to a marked decrease in acetyl esterase (isoform 1); two species-specific esterases also disappeared. Only trace tissue-specific alkaline phosphatase was detectable. One of the four carboxylesterase isozymes increased by 72 hr, coincident with an elevation in one glycolipoprotein fraction. Certain esterase and lipoprotein fractions also increased by 72 hr. Of the original 26-27 tissue antigens in controls, only 14-15 were demonstrable at 72 hr. No novel radiation antigens were detected, but the data support the distinction between radioresistant and radiosensitive proteins.

6275 A RABBIT MODEL OF PERFORATED APPENDICITIS WITH PERITONITIS. (Eng.) King, D. W.; Gurry, J. F.; Ellis-Pegler, R. B.; Brooke, B. N. (St. Mark's Hosp., London, England). *Br. J. Surg.* 62(8):642-644; 1975.

Attempts were made in rabbits to produce an animal model of peritonitis akin to that found in humans. The base of the appendix was tied with silk thread, leaving the blood supply intact. Using the same incision, laparotomy was performed 18 hr after the first operation. If perforation had not occurred spontaneously, the appendix was incised near the base, allowing the contents to enter the peritoneal cavity. The wound was then closed. Six hours later, appendectomy was performed through the same incision. Twenty-eight of 32 rabbits survived these operations. Twenty of the appendices in the surviving rabbits perforated spontaneously by the time of the second operation. In eight rabbits that lived for at least 14 days and were killed during the third week, necropsy showed a diffuse purulent peritonitis with many adhesions, resulting in multiple abscesses throughout the peritoneal cavity, particularly the caudal half. In 13 rabbits (9 with spontaneous perforation and 4 with artificial perforations), enterobacteria, staphylococci, streptococci, bacilli, lactobacilli, yeasts, bacteroides, bifidobacteria, and clostridia were distributed in a manner similar to that in pus taken at operation in 14 patients with perforated appendicitis with purulent peritonitis. Histologically, the appearances of all the specimens examined were similar and had many features in common with those seen in acute appendicitis in man. However, in the rabbit, suppuration was generally less pronounced and less evenly distributed throughout the wall, and there was a zone of suppurative necrosis extending from the mucosa into the superficial parts of the lymphoid follicles. The latter is not normally seen in humans. It appears that this model is satisfactory for simulating acute perforating appendicitis followed by peritonitis in man, and that postoperative survival is achieved, enabling therapeutic studies to be carried out.

6276 FIBEROPTIC-COUPLED ARGON LASER IN THE CONTROL OF EXPERIMENTALLY PRODUCED GASTRIC BLEEDING. (Eng.) Waitman, A. M.; Spira, I.; Chryssanthou, C. P.; Stenger, R. J. (Beth Israel Medical Center, 10 Nathan D. Perlman Place, New York, NY 10003). *Gastrointest. Endosc.* 22(2):78-81; 1975.

The use of laser photocoagulation for the control of gastric hemorrhage is reported. An argon laser with an output of 2 watts was used in conjunction with conventional fiberoptic endoscopy to control bleeding lesions mechanically produced in the anterior stomach wall of four adult mongrel dogs. Laser irradiation was applied to the experimental sites within 1 min of the onset of bleeding. The photocoagulation process was begun by directing the laser beam to the margin of the defect and by holding the tip of the fiberoptic bundle 2 mm from the surface of the tissue until it produced a charred coagulum. The laser beam was then directed to adjacent areas, working from the periphery to the center until the entire surface of the defect was sequentially photocoagulated. This process required 2-3 min. The time exposure of each individual area treated ranged from 1 to 5 sec, with the central areas of the base of the defect requiring the longest irradiation periods. In all laser-irradiated lesions, hemorrhage ceased immediately upon completion of photocoagulation. Histologic examination of photocoagulated ulcers indicated that morphologic alterations induced by laser irradiation were limited to the target area and did not extend to the muscularis propria or serosa. In laser-irradiated lesions removed 5-30 min after photocoagulation, the vessels in the target area and in the tissues adjacent the margins of the defects contained amorphous yellow-pink material, while the vessels in the surrounding tissue were filled with RBC and marginating WBC. This suggests that circulation was interrupted in the target area, but not in the surrounding tissue, as evidenced by the active process of WBC margination and migration. Sites of photocoagulated ulcers examined 3 weeks after irradiation showed no gross evidence of the lesion, but microscopically, these sites showed reparative changes (almost complete re-epithelization of the surface of former defects and the presence of granulation tissue in the gap of the lesion), which appeared to be more delayed than would normally be expected.

6277 EXPERIMENTS ON MONKEYS WITH CHOLERA TOXIN PARTIALLY PURIFIED AND DETOXIFIED WITH FORMOL AND GLYCINE. (Eng.) Saletti, M.; Ricci, A. (Istituto Sieroterapico e Vaccinogeno Toscano A. Sclavo, Siena, Italy). *Bull. WHO* 51(6):641-645; 1974.

Because previous studies have shown that highly purified cholera toxin detoxified with glutaraldehyde loses its immunizing capacity, and that toxin detoxified with formol reverts *in vivo*, studies were conducted to determine whether cholera toxin partially purified with aluminum hydroxide and detoxified with formol in the presence of glycine remains harmless and retains its capacity to stimulate antitoxins. Rhesus monkeys were divided into seven groups and inoculated with 1-ml doses of toxoid (10, 50, or 100 μg, s.c.), toxin (50 or 100 μg, s.c.), cholera vaccine, or saline. In monkeys inoculated with toxin, a local reaction characterized by erythema and edema appeared on the second or third day after inoculation and lasted for 10-12 days. The animals inoculated with toxoid, vaccine, or saline gave no macroscopic reaction. Histological examination of skin biopsies revealed that toxin at either dose caused edema in the reticular dermal zone, together with phlogistic cellular infiltrates composed of diffused lymphocytes or perivascular accumulation of lymphocytes. Toxoid did not cause any change in the dermis and epidermis, and there was no evidence of edema or hemorrhage. The vaccine produced edema in the entire dermis. After a single dose of 100 μg of toxoid, only one monkey had a detectable antitoxin level (20 AU/ml). After a second inoculation, the two animals treated with 2 x 100 μg toxoid showed total antitoxin levels of 160-250 AU/ml. Of all the monkeys vaccinated with toxoid, only one (inoculated with 2 x 50 μg toxoid) showed a slight skin reaction to a challenge dose of 100 μg of toxin at the inoculum site. All animals inoculated with toxoid showed vibriocidal antibodies 1 month after the first vaccination; the vibriocidal antibodies increased considerably after the second inoculation. The lack of reactivity and the stimulation of antitoxins in monkeys inoculated with cholera toxin partially purified and detoxified with formol in the presence of glycine, can solve the problem of preparing a safe and antigenic cholera toxoid.

6278 EXPERIMENTAL INFECTION OF CHIMPANZEES WITH HEPATITIS A VIRUS. (Eng.) Dienstag, J. L.; Feinstone, S. M.; Purcell, R. H.; Hoofnagle, J. H.; Berker, L. F.; London, W. T.; Popper, H.; Peterson, J. M.; Kapikian, A. Z. (Natl. Inst. Health, Building 7, Room 301, Bethesda, MD 20014). *J. Infect. Dis.* 132(5):532-545; 1975.

The susceptibility of chimpanzees to type A viral hepatitis was examined with immune electron microscopy. Two seronegative infant chimpanzees were inoculated with a hepatitis A acute-phase stool filtrate rich in 27-nm virus-like hepatitis A antigen (HA Ag) particles, and two were inoculated with an HA Ag-negative preinfection stool filtrate. One of each pair of chimpanzees was inoculated i.v., the other p.o. One month later, both chimpanzees that had received the HA Ag-positive filtrate developed elevated SGPT levels, lassitude, and anorexia, suggestive of acute viral hepatitis. HA Ag particles (27 nm) were detected in their stools by immune electron microscopy; particle shedding followed a pattern similar to that in human volunteers. Immune electron microscopy also showed that antibody to HA Ag had developed in the convalescent-phase sera of the infected chimpanzees. Control animals remained free of illness at this time, but did develop hepatitis 3-5 weeks after exposure to the two infected chimpanzees. The infectious inoculum was titrated in two additional seronegative chimpanzees. Hepatitis A can be successfully transmitted to seronegative chimpanzees. These studies provide further evidence that the 27-nm virus-like HA Ag particle is the etiologic agent of viral hepatitis type A.

6279 GROWING SMALL-BOWEL MUCOSA: AN EXPERIMENTAL APPROACH TO THE SHORT-BOWEL SYNDROME. (Eng.) Norton, L. W.; Dogru, M.; Esato, K.; Eiseman, B. (Denver General Hosp., Denver, CO). *Surg. Forum* 26:391-392; 1975.

Experiments were conducted to determine whether small bowel mucosa can grow on muscular or peritoneal surfaces and to devise procedures by which the small bowel absorptive area can be increased. Dogs were placed in one of four groups and subjected to different procedures. In group 1 (5 dogs), a 10-cm segment of transverse colon with vascular pedicle was everted and stripped of mucosa to the level of the muscularis. The reinverted segment was interposed isoperistaltically in the ileum 150 cm proximal to the ileocecal valve. At 6 weeks (3 dogs), the segments of interposed colon had contracted to an average 7-cm length and were lined by mucosa without villi. By 13 weeks (2 dogs), a villous surface pattern was identified. In group 2 (6 dogs), a 20-cm colon segment was similarly interposed in the ileum. In two additional dogs, the segment was divided, and each piece incised along the antimesenteric border. These pieces were anastomosed to create an interposed pouch 10 cm in length with twice the normal colon diameter. Three dogs in this group died due to loss of motility in the segment. The three survivors had neomucosa lining the shortened (30%) segment at 6 weeks. In the two additional animals with widened pouches, mucosa with villi was evident at 13 weeks. In group 3 (5 dogs), a 23-cm segment of colon was stripped of mucosa and divided into longer (20-cm) and shorter (3-cm) portions, each with vascular pedicle. The longer segment was anastomosed end-to-side to the ileum 150 cm from the cecum, and the opposite end was left unclosed within the abdomen as a control. Laterally anastomosed colon segments were shortened (50%) at 6 weeks. In two dogs, the segment was occluded 2 cm from the ileum. Neomucosa had developed proximal but not distal to the obstruction. In three other animals, the segment was completely lined with mucosa at 6 weeks. No mucosa developed in control segments. In group 4 (9 dogs), the ileum was divided 150 cm from the cecum. The proximal end was anastomosed end-to-side to the ileum 100 cm from the cecum. The open end of the distal ileum was sutured to parietal peritoneum over a 4 x 5-cm area. Extension of mucosa across the peritoneum was evident by 3 weeks (2 dogs). By six weeks (3 dogs), the peritoneum was covered by mucosa, which showed early villous formation. Small bowel mucosa has regenerative properties that may be useful in patients with the short-bowel syndrome.

6280 CONGENITAL HYPERTROPHIC PYLORIC STENOSIS: A GASTRIN HYPOTHESIS PURSUED. (Eng.)
Rogers, I. M.; Macgillion, F.; Drainer, I. K. (Royal Infirmary, Glasgow G4 OSF, Scotland). *J. Pediatr. Surg.* 11(2):173-176; 1976.

The hypothesis that the steep rise in fasting gastrin levels seen in neonates produces enough pyloric hold-up in some infants to initiate a self-perpetuating sequence of events leading to hypertrophic pyloric stenosis was tested by determining the effects of pentagastrin and acetylcholine on isolated strips of the pyloric circular muscle of eight baboons. Acetylcholine (1-20 μg/ml) caused a dose-dependent contractile response in all eight strips. This response was blocked by atropine. Pentagastrin (4-10 μg/ml) produced a contraction in four of seven strips tested. Since atropine had been administered to the baboon before the pylorus was taken, it is possible that the inconsistent response to pentagastrin was due to a relative inability of pentagastrin to break the barrier to contraction caused by atropine. The results are compatible with the hypothesis that gastrin plays a part in the development or maintenance of hypertrophic pyloric stenosis in infancy.

6281 STRESS ULCER PREVENTION BY METYRAPONE. (Eng.) Stamford, W.; Smoke, R.; Rettura, G.; Levenson, S. M.; Seifter, E. (Albert Einstein Coll. Medicine, Bronx, NY). *Surg. Forum* 26:371-373; 1975.

The pathogenesis of acute erosive gastritis was studied in male Sprague-Dawley rats. Because endogenous glucocorticoids are thought to have a central role, the actions of metyrapone and vitamin A were studied in rats subjected to a stress ulcer regimen (total body restraint for 24 hr). In some experiments, rats were killed 6 or 12 hr after restraint to observe preulcer changes in the stomach. Multiple large ulcers occurred in the stomachs of all 17 stressed controls and in 3 of 17 animals treated with metyrapone (200 mg/kg in the diet for 3 days prior to restraint). There were seven normal stomachs in the metyrapone-treated animals and none in the controls. Craters were observed in nine controls, but in none of the animals treated with metyrapone. The weight loss among controls was 36 g, while that in the treated animals was 30 g; the thymus weight in controls was 459 mg, while that in the treated animals was 506 mg. Treatment with vitamin A palmitate (150,000 U/kg in diet for 3 days prior to restraint) afforded approximately the same degree of protection as did metyrapone. Rats receiving diets containing both agents were not protected against ulceration to a greater extent than were those receiving only one of the compounds. The serosal side of fixed distended stomachs of the metyrapone- or vitamin A-fed rats was pink, while that of the controls was ischemic and more opaque; this suggests that ischemia precedes ulceration. The protective action of metyrapone in the stress ulcer system may be due to either decreased corticosterone levels or to increased deoxycorticosterone (DOC), which intermediately builds up when 11-β-hydroxylase is inhibited. The similarity in the actions of metyrapone and DOC in other systems suggests that the accumulation of the latter compound contributes to the protective action of metyrapone in stress ulcers. As both DOC and vitamin A are pro-inflammatory, they may be acting to block the actions of glucocorticoids synthesized in response to stress.

6282 EXPERIMENTAL AUTOTRANSPLANT OF THE SMALL INTESTINE IN PIGS: HISTOLOGIC, HISTOENZYMOLOGIC AND ULTRASTRUCTURAL STUDY. (Fre.) Chomette, G.; Cerf, M.: Hay, J.-M.; Preel, J.-L.; Garnier, H. (Groupe hospitalier La Pitie-Salpetriere, 83, boulevard de l'Hopital, 75013, Paris, France). *Ann. Anat. Pathol. (Paris)* 20(4):343-356; 1975.

Orthotopic intestinal autografts were carried out in 22 Large White or Pitman Moore pigs to study the effects of surgery and the ensuing anoxia on the function and histology of the intestinal mucosa. Intestinal function was studied by measuring xylosemia after intraluminal perfusion of 1 g/2 kg of D-xylose via a Thomas intra-intestinal cannula and the presence of lactase, maltase, sucrase, and L-leucyl-β-naphthylamidase in the intestinal mucosa. Absorption of intraluminal instillation of 50 ml of a corn oil emulsion was also observed. Absorption of xylose decreased as did enzyme levels. By day 15, absorption of xylose was normal, but enzyme levels had continued to decrease with some leveling after day 7. Absorption of lipids also decreased and remained low. Animals were sacrificed on days 1, 3, 5, 7, and 15. Conventional histological studies showed a basically unaltered mucosal structure, however, electron microscopy revealed early lymphatic and vascular dilation accompanied by edema and followed by inflammation. There were also discrete but diffuse alterations of the villous enterocytes and of the crypt cells, affecting regeneration and characterized by an abnormally high number of goblet cells. The authors conclude that up to 15th day only gross histological examination of the intestinal mucosa is valuable for detection of immunological rejection of grafts. Biological and ultrastructural studies revealed reaction of the mucosa to surgery and anoxia, maximal on the 7th postoperative day.

6283 RADIOAUTOGRAPHY OF HETEROTOPIC AUTOGRAFTS OF ILEAL MUCOSA IN RATS AFTER PARTIAL ENTERECTOMY. (Eng.) Tilson, M. D.; Livstone, E. M. (Yale Univ. Sch. Medicine, New Haven, CT). *Surg. Forum* 26:393-394; 1975.

The hypothesis that intraluminal chyme plays a role in the initiation of compensatory hypertrophy of the ileum after jejunectomy was tested in 10 Sprague-Dawley rats. Explants of mucosa were removed from the lumen and transplanted beneath the capsule of the kidney after 50% midgut resection and sham-operation. The mean diameter of crypts in the experimental explants was increased 81% over that in the sham explants (131 μ versus 72 μ; $p<0.05$). The mean number of cells per crypt was increased 30% in the experimental group (29.3 versus 22.5; $p<0.001$). The mean number of cells labeled with tritiated thymidine per crypt was increased threefold in the experimental group (11.7 versus 3.7; $p<0.001$), and the percentage of labeled cells per crypt was more than doubled (39.9% versus 16.5%; $p<0.05$). These observations suggest that there is a humoral stimulus for the proliferation of enterocytes after partial enterectomy in the rat.

6284 OPEN PEDICLE GRAFTS OF ILEUM FOR THE REPAIR OF LARGE DUODENAL DEFECTS: AN EXPERIMENTAL STUDY. (Eng.) Gupta, A. K.; Garg, B. K.; Kansal, Y. K.; Sharma, B. D. (Sarojini Naidu Medical Coll., Agra, India). *Br. J. Surg.* 63(3): 241-244; 1976.

The use of open pedicle grafts of ileum for the repair of large duodenal defects was studied in 20 healthy dogs. Full thickness defects were created in the second part of the duodenum by excising a portion of the antimesenteric wall comprising 70-80% of the circumference and measuring 6-9 cm in length. A segment of distal ileum isolated on a mesenteric pedicle was brought to the region of the duodenum through the transverse mesocolon; continuity of the ileum was reestablished by end-to-end anastomosis. The isolated ileal segment was opened along its antimesenteric border to form a full thickness, rectangular patch of approximately the same size as the duodenal defect. Half of the ileal segments were placed in an isoperistaltic direction, and the other half in an antiperistaltic direction. Barium meal examinations, followed by exploratory laparotomy and sacrifice, were carried out at 2, 6, and 12 weeks postoperatively. Two dogs died of peritonitis within 4 days of the operation, and a third had a cardiac arrest immediately following surgery. In the 17 remaining animals, the flow of barium through the duodenum did not seem to be affected by either the isoperistaltic or antiperistaltic patches. The pedicles of the grafts were healthy and intact. There was no ulceration or shrinkage of the grafts. On histologic examination, the healing was good, and the ileal mucosa retained its villi. This study indicates that in large, linear, or circumferential defects of the duodenum the open pedicle grafts of distal ileum are extremely useful.

6285 EFFECT OF SUBDIAPHRAGMATIC VAGOTOMY ON PRODUCTION OF GASTRIC ULCERS IN PYLORUS-LIGATED ALBINO RATS. (Eng.) Ganguly, A. K.; Lal, S. K. (Jawaharlal Inst. Post-Graduate Medical Education, Res., Pondicherry-6, India). *Experientia* 32(1):74-75; 1976.

The effect of complete subdiaphragmatic gastric vagotomy on the production of ulcers was studied in pylorus-ligated rats. In seven animals, the pylorus was ligated, and in nine animals, a subdiaphragmatic vagotomy was followed by pyloric ligation. The mean ulcer index in the rats with an intact vagus nerve was 0.40, while that in the vagotomized animals was 0.039. In the vagotomized animals, the mean volume of the gastric content (3.43 ml) and the mean free acidity of the gastric content (2.44 U) were significantly lower than in the animals with an intact vagus nerve (7.64 ml and 22.14 U, resp.). In the vagus-intact animals, the ulcers occurred in the fundus alone in five cases and in the fundus and body in two cases. In the vagotomized animals, the ulcers occurred in the body alone in six cases and in the body and fundus in one case. The results show that the beneficial effect of vagotomy against the development of ulcers must be due to the reduction in vagus- and gastrin-mediated gastrin secretion.

6286 EXPERIMENTALLY INDUCED CANINE TOXOCARIASIS: LABORATORY EXAMINATIONS AND PATHOLOGIC CHANGES, WITH EMPHASIS ON THE GASTROINTESTINAL TRACT. (Eng.) Hayden, D. W.; Van Kruiningen, H. J. (Mason Research Inst., Worcester, MA 01608). *Am. J. Vet. Res.* 36(11):1605-1614; 1975.

6287 IMPORTANCE OF LYMPHATIC DRAINAGE IN ISCHEMIA OF THE LIVER. III. CHANGES OF BILIRUBIN, CHOLESTEROL AND SOME ENZYMES. (Cze.) Bartos, V.; Vosmik, J.; Vucinic, M.; Pavlok, F. (Centrum vyzkumu transplantaci organu, Institutu klinicke a experimentalni mediciny, Praha 4-Krc, Budejovicka 800, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(5):307-313; 1975.

6288 EXPERIMENTAL STUDY OF INFECTIOUS HEPATITIS IN GUINEA PIGS. (Rus.) Ashrafova, R. A.; Tulyaganov, P. D.; Kasymkhodzhaev, E. S. (Inst. Chemistry of Vegetable Substances, Uzbek SSR Acad. Sciences, Tashkent, USSR). *Arkh. Patol.* 38(4): 49-54; 1976.

6289 SOME MECHANISMS OF REDUCTION OF CAROTENOID LEVELS IN CHICKENS INFECTED WITH *Eimeria acervulina* OR *E. tenella*. (Eng.) Ruff, M. D.; Fuller, H. L. (Dept. Poultry Science, Univ. Georgia, Athens, GA 30602). *J. Nutr.* 105(11):1447-1456; 1975.

6290 PATHOGENESIS OF CERTAIN MYCOBACTERIOSES IN A CHEMICALLY DAMAGED LIVER OF THE RABBIT. (Ger.) Dornetzhuber, V.; Burjanova, B. (Inst.

fur Tuberkulose u. Lungenerkrankungen, 83400 Bratislava-Podunajske Biskupice, Czechoslovakia). *Z. Erkr. Atmungsorgane.* 143(1):61-65; 1975.

6291 SOME MORPHOLOGICAL CHANGES IN RATS WITH INTESTINAL DYSBACTERIOSIS. (Rus.) Panchishina, M. V.; Rudnitskaya, A. Y.; Shegedin, Y: I. (Lvov Medical Inst., Lvov, USSR). *Zh. Mikrobiol. Epidemiol. Immunobiol.* (6):110-113; 1975.

6292 THE EFFECT OF MALNUTRITION IN THE EARLY PERIOD OF POSTNATAL ONTOGENESIS ON THE AMYLOLYTIC AND INVERTASE ACTIVITY OF THE SMALL INTESTINE MUCOSA IN GROWING RATS. (Rus.) Rakhimov, K. R.; Sadykov, B. A. (Dept. Physiology, Uzbek SSR Acad. Sciences, Tashkent, USSR). *Vopr. Pitan.* (2):66-69; 1976.

6293 BILE SECRETION AND CHEMICAL COMPOSITION OF BILE IN RATS UNDER LIVER TISSUE DYSTROPHY DURING THE TREATMENT WITH SODIUM SELENITE. (Rus.) Danik, L. M. (Chair Pharmacology, Medical Sch., Ternopol, USSR). *Vopr. Med. Khim.* 22(2):254-257; 1976.

6294 INFLUENCE OF LAENNEC ON LIVER REGENERATION AFTER PARTIAL HEPATECTOMY. (Jpn.) Sakamoto, K.; Kasahara, T.; Nakakawaji, K.; Hayashi, M.; Takahashi, I. (Tokyo Medical Coll., Tokyo, Japan). *J. Tokyo Med. Coll.* 33(2):271-278; 1975.

6295 ULTRASTRUCTURAL STUDY OF PHOSPHOLIPID ACTIVITY IN ISONIAZIDE-INDUCED EXPERIMENTAL HEPATIC LESIONS. (Ita.) Dina, M. A.; Sacchettoni Logroscino, G.; Caprino, L.; Togna, G. (Istituto di Anatomia ed Istologia Patologica, Universita Cattolica del S. Cuore, Rome, Italy). *Farmaco (Sci.)* 30(12):955-964; 1975.

6296 THE EFFECT OF MEDICINAL THERAPY ON THE ACTIVITY OF ENZYMES, LIPID AND PHOSPHOLIPID SPECTRA IN ACUTE EXPERIMENTAL PANCREATITIS. (Rus.) Kryuchok, A. G.; Gurevich, G. L.; Murzenok, P. P.; Taganovich, A. D. (Minsk Medical Inst., Minsk, USSR). *Patol. Fiziol. Ekspr. Ter.* (2):74-77; 1976.

6297 THE LAXATIVE EFFECT OF ANTHRAQUINONE DERIVATIVES. I. INFLUENCE OF ANTHRACENE DERIVATIVES PRESENT IN Sennae Folium AND Sennae Fructus ON WATER AND ELECTROLYTE MOVEMENT IN THE RAT COLON. (Dut.) Lemmens, L. (Department van Farmaceutische Wetenschappen, Katholicke Universiteit te Leuven, Van Evenstraat 4, 3000 Leuven, Belgium). *Pharm. Weekbl.* 111(6):113-118; 1976.

6298 TECHNICAL PARTICULARS OF EXTRACORPOREAL INCLUSIONS OF THE CAT LIVER INTO THE CIRCULATION OF A HEPATECTOMIZED RABBIT. (Rus.) Nikulin, V. I.; Smirnov, L. S.; Eizenberg, L. A.; Kirotkina, R. N.; Kharnas, S. Sh. (A. V. Vishnevskii Inst. Surgery, USSR Acad. Medical Sciences, Moscow, USSR). *Eksp. Khir. Anesteziol.* (2):41-44; 1976.

6299 EXPERIMENTAL STUDIES ON HISTOLOGICAL CHANGES OF THE PANCREAS AFTER PANCREATICODUODENOSTOMY. (Jpn.) Nakagawa, I. (Kumamoto Univ. Medical Sch., Kumamoto, Japan). *J. Kumamoto Med. Soc.* 49(2):160-174; 1975.

6300 EXPERIMENTAL TRANSPLANTATION OF PANCREAS AND DUODENUM. (Pol.) Gutauskas, M. K. (Dept. General Surgery, Vilnius Univ., Vilnius 232000, Kosciuskos 32-37, USSR). *Pol. Przegl. Chir.* 48(4):481-485; 1976.

6301 EXPERIMENTAL ORTHOTOPICAL TRANSPLANTATION OF THE LIVER IN PIGS. (Dan.) Agger, P.; Burcharth, F.; Heisterberg, L.; Fibiger-Henriksen, P.; Johansen, T. S.; Larsen, H. W.; Lindahl, F. (Kobenhavns amts sygehus, afdeling S, Gentofte, Denmark). *Ugeskr. Laeger* 138(15):905-907; 1976.

6302 HISTOCHEMICAL CHANGES OF ENZYMES AFTER SMALL INTESTINAL RESECTION IN THE DOG. (Jpn.) Nakaya, S. (Hirosaki Univ. Sch. Medicine, Hirosaki, Japan). *Hirosaki Med. J.* 26(3/4):361-379; 1974.

6303 CRYOSURGERY OF THE ESOPHAGUS AND CARDIA IN EXPERIMENTS ON ANIMALS. (Pol.) Przywara, S.; Godel, M.; Zygmunt, J. (Klinika Chirurgii Onkologicznej Instytutu Onkologii, 44-101 Gliwice, ul. Wybrzeze Armii Czerwonej 13, Poland). *Pol. Przegl. Chir.* 48(5):587-591; 1976.

6304 NEW METHOD FOR SECURING COLON ANASTOMOSIS. EXPERIMENTAL RESULTS WITH PEDICLED PERITONEAL FLAPS. (Ger.) Klein, P. (Chirurgische Universitatsklinik Marburg/L., Robert-Koch-Strasse 8, D-3550 Marburg, W. Germany). *Langenbecks Arch. Chir.* 341(1):51-61; 1976.

GENERAL

6305 ADHERENCE OF PATHOGENIC Escherichia coli TO EPITHELIAL CELLS ISOLATED FROM THE INTESTINAL MUCOSA OF THE RABBIT. (Fre.) Demierre, G.; Rivier, D.; Hilpert, H.; Gerber, H.; Zinkernagel, R. (Hopital cantonal, CH-1011 Lausanne, Switzerland). *Pathol. Biol. (Paris)* 42(3):137-146; 1975.

6306 STUDIES ON THE INTERACTION OF INSULIN AND INSULIN RECEPTORS IN RAT LIVER CELL MEMBRANES. (Jpn.) Sakai, Y.; Hara, H.; Kawate, R.; Kawasaki, T. (Univ. Sch. Medicine, Hiroshima, Japan). *Folia Endocrinol. Jpn.* 51(7):601-608; 1975.

6307 ULTRASTRUCTURE AND MORPHOGENESIS OF CEROID PIGMENT: II. LATE CHANGES OF LYSOSOMES IN KUPFFER CELLS OF RAT LIVER AFTER PHAGOCYTOSIS OF UNSATURATED LIPIDS. (Ger.) Kajihara, H.; Totovic, V.; Gedigk, P. (Res. Inst Nuclear Medicine and Biology, Hiroshima Univ., 734 Hiroshima-Shi, Kasumi-Cho 1-2-3, Japan). *Virchows Arch.* [*Cell Pathol.*] 19(3):239-254; 1975.

See also, 6144, 6208, 6440.

DIAGNOSTIC PROCEDURES

6308 α_1-FETOPROTEIN AND REGAN ISOENZYME IN THE SERUM IN MALIGNANT TUMORS OF THE GASTROINTESTINAL TRACT. (Ger.) Lehmann, F.-G. (No affiliation given). *Z. Gastroenterol.* 14(Suppl.): 268-269; 1976.

Serum regan isoenzyme (RI) of alkaline phosphatase and alpha$_1$-fetoprotein (FP) levels in gastrointestinal malignancy were determined by a variety of methods. In 74 gastric carcinomas, elevated FP was found in 4% by double diffusion (DD), 8% by electrophoresis (EP), 33.3% by passive hemagglutination (PHA), and 16-36% by radioimmunoassay (RIA). In 63 colon carcinomas, the recovery rate was 0% in DD, 2.2% in EP, 11.1% in PHA, and 11.1-42.2% in RIA. In 59 pancreatic carcinomas, 0% was recovered by DD and EP, 33.3% by PHA, and 8.5-21.3% by RIA. In 36 gallbladder or bile duct cancers, FP was identified in 4.2% by DD and EP, 25% by PHA, and 21-50% by RIA. In five small intestinal tumors, EP and DD found 0%, PHA 40%, and RIA 40-60%. In 34 liver carcinomas, DD was 56%, EP 75.4%, and PHA and RIA 100% positive. Nonspecific FP increases up to 2,000 mg/ml in gastrointestinal tumors. Using immune absorbance with insoluble anti-RI-gamma globulin, elevated RI was found in 54% of 13 pancreatic carcinomas, 29% of 31 colon carcinomas, 27% of 11 primary liver carcinomas, 14% in gallbladder or ductal cancers, and 10% of gastric carcinomas. In a prospective study of 264 cirrhotics, FP (by RIA) was found in 11 with clinically unsuspected carcinoma. In posthepatic, postalcoholic, and cryptogenic cirrhosis, the carcinoma incidence was equally high; transient FP was found in 22% of the cases. There is no correlation between serum FP and biochemical variables (GOT, GPT, bilirubin, prothrombin, and gammaglobulin) or clinical stage (compensated cirrhosis, coma, and ascites). A primary liver carcinoma is found in over 10% of subjects with serum FP of 20-2,000 ng/ml.

6309 ANGIOGRAPHY OF THE GALLBLADDER AND BILIARY TRACT. (Eng.) Kaude, J. V.; Hawkins, I. F., Jr. (Univ. Florida Coll. Medicine, JH Miller HC, Box 730, Gainesville, FL 32610). *Semin. Roentgenol.* 11(3):191-195; 1976.

Angiography of the gallbladder and biliary tract is reviewed, and the value of various injection sites and the effect of vasoactive drugs were studied by evaluating 174 injections in 102 patients. Angiography has been utilized only rarely for the primary evaluation of the gallbladder. There are several reasons why it should be used more frequently: cancer of the gallbladder ranks fifth in incidence among all digestive tract cancers; angiographic findings are reliable in diagnosing gallbladder cancer; and early diagnosis of biliary tract cancer is infrequently made by conventional methods. Celiac artery and superior mesenteric artery injections (50 ml at 10 ml/sec) are performed initially to serve as a road map for more optimally selective injections. The hepatic, gastroduodenal, or posterior pancreatoduodenal artery is then selected and catheterized. A relatively high pressure injection (10-12 cm^3/sec) results in good arterial detail. A slow hepatic artery injection (5-6 ml/sec for a total of 50-60 min) usually provides excellent visualization of the gallbladder (arterial, capillary, and venous) and of the liver. Exposures are obtained in anteroposterior, right posterior oblique, and occasionally, left posterior oblique projections. The femoral percutaneous approach is most frequently employed. The gallbladder was visualized in 78% of the 102 patients studied. Visualization was rated on a scale of 0 to 3+, 0 being nonvisualization of the gallbladder wall. The highest rating was 1+ in 35 cases, 2+ in 24 cases, and 3+ in 20 cases. The 0 and 1+ ratings occurred predominately from celiac artery injections without tolazoline. The average ratings for the superior mesenteric artery, celiac artery, or hepatic artery as the injection site were 0.62, 0.68, and 1.4, resp. When celiac artery injection was accompanied by tolazoline or epinephrine, the values were 1.2 and 0.37, resp. When hepatic injection was accompanied with tolazoline or epinephrine, the values were 2.4 and 0.29, resp. A slow hepatic artery injection resulted in an average rating of 1.8, and with tolazoline, the value was 2.9. This study and previous experience show that the gallbladder and biliary tract can be consistently visualized with hepatic artery injection with tolazoline.

6310 EXTRAHEPATIC AND INTRAHEPATIC ANGIOGRAPHY AND PRESSURE MEASUREMENT DURING LAPAROSCOPY. (Ger.) Knoblauch, M.; Funk, C.; Binkert, D.; Lammli, J. (Medizinische Universitatsklinik, Kantonsspital, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 104(50): 1886-1887; 1974.

Experiences with angiography (AG) and pressure measurement (PM) via laparoscopic puncture in 19 patients are reviewed. PM in the splenic pulp, intrahepatic portal vein segment, and liver parenchyma represents the pressure in the entire portal region. If all three are identical, there is no thrombosis in the splenic or portal veins. PM in the splenic parenchyma is frequently 1-2 mm Hg higher than in the liver. Since the presentation of indirect, arterial portography in splenomegaly can simulate portal vein thrombosis due to deficient contrast media density, angiographic supplementation is required. Modest splenomegaly often accompanies chronic persistent and subacute necrotizing hepatitis. In three patients, splenic PM was normal, suggesting that persistent viral infection and not elevated portal pressure was responsible. Intrahepatic puncture for AG and PM is of special value in suspected splenic vein or extrahepatic portal vein thrombosis, left hypochondriacal adhesions, and splenectomy follow-up.

6311 ULTRASOUND AND THE GALLBLADDER. (Eng.) Gosink, B. B.; Leopold, G. R. (Veterans Admin. Hosp., 3350 La Jolla Village Drive, San Diego, CA 92161). *Semin. Roentgenol.* 11(3):185-189; 1976.

The use of ultrasound in the diagnosis of gallbladder disease is reviewed. The procedure cannot be satisfactorily performed in the presence of gastrointestinal barium, excessive intestinal gas (as in patients with nonobstructive intestinal distension or intestinal obstruction), or large abdominal dressings that interfere with placement of the transducer. The liver can often be used as an "ultrasonic window" for visualizing the gallbladder, even in the presence of excessive intestinal gas. In these patients, the transducer is positioned over the liver and aimed toward the gallbladder, thus delineating the organ without interference. The patient should be placed on a low-fat meal the evening before the examination, and should take no food or liquids for approximately 12 hr before the procedure. On transverse sections, the normal gallbladder appears as a rounded-to-oval echo-free structure lying along the medial border of the liver just anterior to the right kidney. The normal gallbladder usually measures less than 8 cm in length, but may measure up to 13 cm. Gallstones appear as strong echoes, lying in the most dependent part of the organ. The sound beam usually dose not penetrate beyond the stones due to their high echo-reflecting capability; a relatively echo-free "acoustic shadow" is produced behind the stones. Gallbladder distension is also readily identified by the use of ultrasound. On both transverse and longitudinal scans, the distended common duct can also be frequently seen. Ultrasound examination of the gallbladder and adjacent pertinent structures is a rapid (15-45 min), simple, and noninvasive means of examining this organ. The procedure is safe, and is readily tolerated, even by very ill patients.

6312 CHOLECYSTOKININ CHOLECYSTOGRAPHY. (Eng.) Goldberg, H. I. (Univ. California Sch. Medicine, San Francisco, CA 94143). *Semin. Roentgenol.* 11(3):175-179; 1976.

Studies concerning the use of cholecystokinin (CCK) cholecystography in the detection of abnormal gallbladder are reviewed. The procedure is performed to detect underlying acalculous cholecystitis, partial cystic duct obstruction, and Oddi's sphincter fibrosis in patients presenting with upper quadrant pain whose p.o. cholecystograms have shown good gallbladder function with no evidence of gallstones. The most commonly used CCK dose is 1 Ivy U/kg, and the radiographic position that best presents the full gallbladder profile is the right posterior oblique position. The injection must be given slowly (1-3 min) so that spasm of the gallbladder neck, resulting in obstruction to outflow of contrast material, will not occur and create a false-positive response. A positive CCK cholecystogram is composed of two parts: the patient must reexperience the same right upper quadrant pain and associated symptomatology and the radiographic gallbladder contraction must be less than 20-40%. Among 42 patients who underwent CCK cholecystography in one study, 28 were diagnosed as having cystic duct syndrome, 8 had sphincter spasm or stenosis, and 6 had hypercontraction of the gallbladder. The diagnosis was confirmed surgically in 25 of the 28 patients with cystic duct syndrome and in 4 of 5 patients with sphincter spasm or stenosis. The eight remaining patients with sphincter abnormalities were characterized radiographically by up to 40% emptying of the gallbladder and delayed emptying into the common bile duct and duodenum. In a previously reported study, 18 Of 78 patients undergoing CCK cholecystography had a positive response; 15 had a cholecystectomy, and 14 experienced either complete cure or marked improvement during the follow-up period of 6 months to 4 yr. Most studies indicate that CCK cholecystography is both a useful method to detect acalculous gallbladder or cystic duct disease and that cholecystectomy will help the patient.

6313 SEROLOGICAL DIFFERENTIAL DIAGNOSIS OF VIRAL HEPATITIS IN ADULTS. (Eng.) Hollos, I.; Laszlo, B.; Palfi, A.; Szecsey, Gy.; Novak, E. (Natl. Inst. Public Health, H-1966 Budapest, P.O.B. 64, Hungary). *Acta Microbiol. Acad. Sci. Hung.* 23(1):29-40; 1976.

To study the specificity of the determination of hepatitis A-associated antigen (IHxAg) to the clinical diagnosis of infectious hepatitis (IH, hepatitis A), the sera of 123 IH patients, 177 patients with other liver and/or biliary tract diseases, and 116 patients with serum hepatitis (SH, hepatitis B) were tested for hepatitis B surface antigen (HBsAg) and IHxAg. A complement-fixation microtest was used for HBsAg and the India-ink immune reaction was used for IHxAg. In 401 healthy men living in camps in closed communities, HBsAg was demonstrated in 1.5%. IHxAg occurred in 12.2%, and both antigens occurred in 0.7%. The incidence of HBsAg seems to be age-dependent and influenced by environmental factors. For patients with other liver diseases, the percentages were 10% for HBsAg, 13.5% for IHxAg, and 4.5% for both. Among the IH and SH cases, 14% were positive for both antigens, 10% were positive for neither of the antigens, and 76% were positive for one of the two antigens. In two-thirds of the single-positive cases, the antigen corresponded to the clinical diagnosis. SGPT and thymol turbidity values agreed with the serological findings better than with the clinical diagnosis. The number of days in the hospital appeared to be related to both the serological findings and the clinical diagnosis. The clinical course was the most severe for patients having both antigens in their blood. IHx antibodies from early convalescence were sensitive to 2-mercaptoethanol, whereas those from a later stage were resistant. No correlation was found between the presence of IHxAg and that of the rheumatoid factor. The IHx India-ink reaction was disturbed by the presence of labile serum proteins, while the essentially similar reverse passive hemagglutination reaction was unaffected by them. Testing for IHxAg seems to be a valuable procedure in the differential diagnosis of IH and SH, although previous studies have suggested that the results are more accurate in children than adults.

6314 NEW LABORATORY METHOD TO DETECT HEPATITIS-B (AUSTRALIA) ANTIGEN BASED ON 'ANOMALOUS' LACTATE DEHYDROGENASE ISOENZYME. (Eng.) Baxi, A. J.; Bapat, J. P.; Damle, S. R.; Talavadekar, R. V.;

Rajpal, R. M.; Dave, J. K. (Blood Group Reference Center Unit, Haffkine Inst., Parel, Bombay 12, India). *Vox. Sang.* 31(1):70-73; 1976.

A new laboratory method for the indirect detection of hepatitis B antigen (HBsAg) is described. The method is based on the electrophoretic detection of "anomalous" lactate dehydrogenase (LDH) isoenzyme, which lies between the LDH$_4$ and LDH$_5$ isoenzyme bands on disc electrophoresis in the sera of patients suffering from liver disease. A sandwich technique using 5.8% acrylamide gel is used. The separator gel is allowed to set, after which 0.2 ml of serum diluted with an equal amount of 40% sucrose solution is layered, then, additional acrylamide solution (5.8%) is poured over the serum to create a sandwich. Electrophoresis is performed for 3 hr at 4 C using Tris-glycine buffer at pH 8.3 and a current of 5 ma per gel. After the electrophoretic run, the gel is stained for 15 min with (concentration per ml): lithium lactate (10 mg), nitro-blue tetrazolium (0.4 mg), NAD (1 mg), and phenazine methosulfate (0.05 mg in 0.1 M Tris buffer). Electrophoretic determinations of anomalous LDH were carried out on 90 known positive carriers of HBsAg, as well as on 315 HBsAg negative persons. All of the HBsAg-positive individuals were positive for anomalous LDH, whereas only 22/315 of the HBsAg-negative individuals were positive for the isoenzyme. The method appears to be useful for the detection of HBsAg.

6315 HEPATOMOGRAPHY: AN EXPERIMENTAL TECHNIQUE USING AN EMULSIFIER. A PRELIMINARY STUDY.

(Eng.) Baltaxe, H. A.; Katzen, B.; Alonzo, D. R.; Wixson, D. (New York Hosp.-Cornell Medical Center, 525 East 68th St., New York, NY 10021). *Radiology* 119(1):27-30; 1976.

The effect of two different ethiodized oil emulsions on the liver parenchyma and their value in hepatomography were evaluated in nine dogs. Ten milliliters of an emulsion containing one part of ethiodized oil to one part of dextran 40 and 0.1% sorbitan polyoxyalkalene 80 was injected into the hepatic artery of four animals; 10 ml of another emulsion containing one part of ethiodized oil, three parts of dextran 40, and 0.1% sorbitan polyoxyalkalene 80 was injected in the other five animals. The ethiodized oil particles did not exceed 5μ, and their average size was 1 μ. Prior to injection of contrast medium, liver lesions (1-5 cm) were created in all animals by the injection of polyethylene glycol disterate into the parenchyma during laparotomy. In all nine dogs, opacification of the liver was adequate to obtain diagnostic tomograms; all lesions were well demonstrated. The contrast material, in all cases, was not radiographically detectable in the liver, lungs, or kidneys 36 hr after injection. When the first emulsion was used, retention of the contrast medium was noted radiographically up to 24 hr following injection in arterial vessels with diameters of 60-110 μ. The SGPT level rose above normal values on the first 3 days in six of seven dogs, but returned to normal within 15 days. The contrast medium was excreted by the kidneys, as demonstrated by the opacification of the renal collecting system, but the blood urea nitrogen remained normal and unchanged throughout the experiment. One dog died of liver failure; at autopsy, an inflamed gallbladder was found, and the histology of the liver was consistent with toxic liver damage. All other dogs tolerated the procedure well. Histologic examination of the liver of one animal sacrificed 36 hr after the injection of contrast medium revealed numerous fat vacuoles and polymorphonuclear cells deposited around the small vessels. There was an early, acute vasculitis and a fairly large number of fat droplets in the hepatocytes and Kupffer cells. In the remaining animals, sacrificed 6 weeks to 4 months after the injection, the liver was normal. Although the mechanism of contrast uptake and retention by the liver is uncertain, it is likely that some of the particles are trapped in the precapillary hepatic arterioles and in the capillaries themselves, whereas others are small enough to cross the pulmonary barrier and to enter the kidney where they are retained.

6316 HEPATIC ECHOGRAPHY.

(Eng.) Hebert, G.; Gelinas, C. (Notre-Dame Hosp., 1560 Sherbrooke East, Montreal H2L 4M1 Quebec, Canada). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1): 51-59; 1975.

A differential echographic approach to liver pathology based on dividing echographic patterns into diffuse of localized categories is presented. From these patterns, which may be echogenic or sonolucent, the following liver diseases may be diagnosed: advanced cirrhosis, congenital fibrosis, mild cirrhosis, carcinomatosis, hepatitis, storage disease, myeloid metaplasia, multicystic liver, hepatoma, single necrotic metastasis, abscess with necrotic fragments, single homogeneous metastasis, adenoma, fibroma, and simple cyst. Two particularly useful echographic signs are the attenuation sign and the posterior echo accumulation sign. The attenuation sign indicates a fibrotic pattern, and indicates the cirrhotic nature of a diffuse echogenic pattern. The posterior echo accumulation sign indicates the liquid nature of the liver, and shows the cystic nature of a localized sonolucent pattern.

6317 THE RADIOGRAPHIC DEMONSTRATION OF FATTY LIVER IN CHILDREN (A CLUE TO PROTEIN MALNUTRITION).

(Eng.) Swischuk, L. E.; McConnell, R. F., Jr. (Univ. Texas Medical Branch, Galveston, TX). *J. Pediatr.* 88(3):452-454; 1976.

In a review of patients with conditions known to predispose to fatty infiltration of the liver, seven patients were found in whom the diagnosis of fatty liver was made from roentgenograms of the chest or abdomen. Three patients had malnutrition of kwashiorkor and three had cystic fibrosis; the etiology in the remaining patient was unknown. In fatty infiltration, the liver loses its normal whiteness and becomes grayer or radiolucent. It blends with the normally gray or radiolucent properitoneal fat stripe, and together these structures extend, as a diffuse radiolucency, to the inner edge of the normally more dense abdominal muscles. In fatty infiltration secondary to protein malnutrition, the cytoplasm of hepatocytes is replaced by large intracellular fat droplets that tend to displace the cell nucleus to the side and produce the characteristic signet cell. In acute hepatic necrosis with fatty degeneration, the intracellular fat droplets are microdroplets, which neither greatly distort the cell nor generally replace the cytoplasm. The detection of this subtle roentgenographic finding can provide an early clue to the presence of protein malnutrition.

6318 DIAGNOSIS OF MALIGNANT LIVER TUMORS BY THIN NEEDLE ASPIRATION BIOPSY. (Eng.)

Dominis, M.; Cerlek, S.; Crepinko, I. (Novosel Hosp., Zagreb, Yugoslavia). *Acta Med. Iugosl.* 29(4):307-316; 1975.

The usefulness of fine needle aspiration biopsy in the cytodiagnosis of malignant liver tumors was studied in 54 cases. The biopsy was performed with a 7-10 cm long needle with an inner diameter of 0.7 mm. Primary hepatoma was diagnosed in 13, metastatic hepatoma in 39, and leukemia in 2 patients. Cytologic diagnosis was confirmed by histological preparations in 24 instances and by laparoscopy in 7. Three cases were false positives due to misidentification of small bile ductular cells, which are frequent in cases of cirrhosis. Primary liver tumor cells were usually in groups, with large, polymorphous nuclei containing enormous, dark gray, sharply demarcated nucleoli, making them easily distinguishable from normal liver cells and from those of cirrhotic liver. Tumors metastatic to the liver were divided into five cytological groups. The small round type of malignant cell had small, round nuclei with hyperchromic, irregular chromatin and scanty, basophilic cytoplasm. The large type of malignant cell had irregular, meshlike chromatin with large, pale, irregular nucleoli; the cytoplasm was faintly blue and irregular. The cylindric malignant cells always occurred in clusters or papillary structures. They were oval, with dense, coarse chromatin and no visible nucleoli; the cytoplasm was scanty and pale blue. Polymorphic cells had large, oval, round, or irregular nuclei, with coarse chromatin and many irregular nucleoli. Pigmented melanoma cells had oval nuclei with very fine, delicate chromatin, and a sharply defined nucleolus. The cytoplasm contained dark green and brownish pigment granules. It is concluded that the technique is useful and reliable.

6319 OPERATIVE AND ENDOSCOPIC PANCREATOGRAPHY IN THE DIAGNOSIS OF PANCREATIC CANCER.

(Eng.) White, T. T.; Silverstein, F. E. (Dept. Surgery, RF-25, Sch. Medicine, Univ. Washington, Seattle, WA 98195). *Cancer* 37(1):449-461; 1976.

Two years of experience with endoscopic retrograde cholangiopancreatography (ERCP) as a method of obtaining x-rays of the pancreas without surgery are reviewed. The pancreatic duct can be visualized in 85-90% of patients. This test is used to detect pancreatic carcinoma in the symptomatic patient and to search for an operative pancreatic lesion in a patient with known recurrent or chronic pancreatitis. Many of these patients have pain or a transiently elevated amylase; a few have steatorrhea or abnormalities of the duodenal sweep on barium meal examination. Stenosis or obstruction of the main pancreatic duct, with or without proximal duct dilation, are the characteristic abnormalities noted in pancreatic carcinoma. A rare pancreatic tumor not in juxtaposition with the duct will have a normal pancreatogram, although the common duct may be obstructed as determined by cholangiography as it passes through the head of the pancreas. In patients with chronic pancreatitis, it may be difficult to differentiate an inflammatory from a neoplastic stricture by either operative or endoscopic pancreatography. In the future, cytologic and biochemical examination of the pancreatic secretions obtained at ERCP may increase the accuracy of diagnosing carcinoma.

6320 DOUBLE-CONTRAST EXAMINATION OF THE SMALL BOWEL WITHOUT INTUBATION. (Ger.)

Novak, D. (Rontgenabteilung der Radiolog. Univ.-Klinik, Universitats-Krankenhaus Eppendorf, Martinistrasse 52, 2000 Hamburg 20, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 125(1):38-41; 1976.

A simple method of oral double contrast examination of the small intestine without intubation is described. Approximately 200 ml of barium sulfate suspension are administered in 15-20 min after the end of gastroduodenal radiology. The patient—preferably lying on the right side—then receives an additional 50 ml of barium sulfate plus six soluble capsules containing 0.6 g of a mixture of tartaric acid, sodium hydrogen carbonate, and dimethylpolysiloxan. On dissolution, the effervescent powder leads to bubble-free CO_2 formation. The consequent dilation of the intestine stimulates propulsion peristalsis. After presentation, 2 mg of glucagon achieves hypotonia. The technique was applied to 130 patients, 17-76 yr old, with tumor suspicion or regional enteritis. Mean passage time was 78 min, contrasted with 126 min in 83 control subjects. Double contrast was achieved in 90 cases. There were no side effects or subjective complaints. The method's advantages are the accelerated media passage with simultaneous presentation of the entire small intestine and better resolution of interior detail.

6321 CLINICAL SIGNIFICANCE OF SMALL INTESTINAL PHOSPHATASE IN THE SERUM. (Ger.)

van Husen, N.; Eberhardt, G.; Gerlach, U.; Oberwittler, W. (Med. Klinik und Poliklinik der Universitat, 44 Munster, Westring 3, W. Germany). *Med. Welt* 26(37): 1645-1647; 1975.

The clinical role of serum alkaline phosphatase (SAP) from the small intestine of patients with chronic liver disease was compared with that of other hepatic metabolic variables. The clinical sample included 16 patients with fatty liver (FL), 26 with chronic active hepatitis (CAH), and 33 with cirrhosis (CR). SAP was increased 13% in FL, 19% in CAH, and 36% in CR. A statistically significant negative correlation between increased SAP and serum cholinestarase was obtained for CAH ($p<0.05$) and CR ($p<0.001$); cholinesterase activity decreases as SAP increases. Gamma-globulin correlated positively with SAP in CAH and CR, confirming the clinical observation that elevated globulin can be pathognomic of liver insufficiency. No correlation was found with serum albumin or prothrombin. The frequency of high SAP correlated well with elevated serum bilirubin ($p<0.01$), delayed bromothalein retention ($p<0.01$), or increased serum leucine aminopeptidase ($p<0.05$) in CAH. An inverse correlation resulted with SGPT in CR. Elevated SAP is a relatively rare occurrence in FL patients. No inference about isoenzyme pattern and no pathophysiological explanations of elevated activity can be drawn from the total SAP assay.

6322 THE ROLE OF URINARY INDICAN AS A PREDICTOR OF BACTERIAL COLONIZATION IN THE HUMAN JEJUNUM.

(Eng.) Mayer, P. J.; Beeken, W. L. (Dept. Medicine, Univ. Vermont, Burlington, VT 05401). *Am. J. Dig. Dis.* 20(11):1003-1010; 1975.

The usefulness of urinary indican as a predictor of bacterial colonization in the human jejunum was evaluated in 35 patients with various gastrointestinal diseases and in 5 controls. Indican excretion ranged from 1 to 840 mg/24 hr in subjects with normal jejunal cultures and from 18 to 742 mg/24 hr in patients with colony counts above 10^4/ml. Neither tryptophan absorption nor fecal nitrogen excretion correlated with indican excretion ($r=0.18$ and 0.04, resp.). There was a statistical correlation between protein loss and urinary indican ($r=0.54$), with endogenous protein loss being abnormal in 27/37 subjects and in 20/29 with high indican values. Lactose tolerance tests and D-xylose, B_{12}, and fat absorption tests showed no predictive value for identifying patients with high colony counts. Compared to quantitative small bowel cultures, none of the tests examined provided a suitable method for screening for bacterial contamination of the human jejunum.

6323 THE APPLICATION OF A COMBINED XYLOSE-LACTOSE TOLERANCE TEST IN CHILDREN WITH SUSPECTED MALABSORPTION.

(Ger.) Brugmann, G.; Niessen, K. H.; Schmidt, K.; Hontzsch, D. (Kinderklinik der Univ. Rumelinstr. 23, D-7400 Tubingen, W. Germany). *Monatsschr. Kinderheilkd.* 124(2):54-58; 1976.

The diagnostic value of serum glucose levels, supplementary to xylose concentrations in describing the status of the small bowel mucosa after xylose-lactose loading in the pediatric malabsorption syndrome was explored. The test included 2 g/kg lactose and 0.5 mg/kg xylose in 20 ml of tea, up to maximum of 50 g lactose and 25 g xylose. Serum was assayed before the test (fasting) and 15, 30, 45, 60, and 90 min afterward, and the results were supplemented by duodenal biopsy. There were 44 patients with normal villi (group A), 12 with injured villi (group B), and 12 with atrophied villi (group C). The fasting values were approximately equivalent in the three groups. At 15 min, the average serum xylose concentration in group A was 15.8 mg/100 ml; in group B, 12.3; and in group C, 7.7. At 45 min, group A had a serum xylose concentration of 28.2 mg/100 ml; B, 20.6; and C, 11.7. At 90 min, A was 34.0 mg/100 ml, B, 30.8, and C, 15.6. Maximum serum glucose concentrations were 55.8 mg/100 ml for A, 27.3 for B, and 17.7 for C. The xylose values alone would be useful in minimizing, without risk, the number of biopsies in cases of suspected celiac disease. In general, discriminant analysis found the overlap between groups to be too extensive to justify setting normal and abnormal limits. The glucose elevation was also found to be clinically negligible, and in agreement with the literature consensus, its routine assay appears unwarranted.

6324 STATISTICAL STUDY OF THE VALIDITY OF THE D-XYLOSE TEST IN THE DETECTION OF PROXIMAL SMALL INTESTINE LESIONS. CHOICE OF DISCRIMINANT PARAMETERS AND THEIR CUT-OFF VALUES.

(Fre.) Mary, J.-Y.; Aymes, C.; Rambaud, J.-C. (Groupe de Recherches sur la Physiopathologie de la Digestion, INSERM, U-54, Paris, France). *Biol. Gastroenterol. (Paris)* 8(4):297-305; 1975.

The validity of the D-xylose test (25 g dissolved in 250 ml of water, imbibed *ad lib*), the most discriminative parameters and their cut-off values were evaluated from a statistical study of 106 control subjects and 26 patients with circumscribed (13) or disseminated (13) small intestinal lesions. Of the 26 patients, 18 had celiac disease, 2 had intestinal lipodystrophy, 4 had undergone jejuno-ileal resection, and there was 1 case each of alpha chain disease and erosive ileitis. D-xylose was measured in the blood (g/l) at 2 and 5 hr, and in the urine (g/ml) between 0 and 2 hr and 2 and 5 hr. Two protocols were deduced from the results. The first method employs the discriminative linear function of blood xylose at 2 hr (S_2) and 5 hr (S_5). By this protocol, 98.4% of the patients with lesions fell under a calculated value (-0.16) and 93.7% of the controls were above the value. For the second procedure, blood xylose was calculated at 2 hr (S_2) and urine xylose was determined within the first 5 hr (U_T) after oral overload. By this method, 90.3% of the patients with lesions and only 3.3% of the controls had S_2 and U_T values, simultaneously, under 0.025 g/l and 4 g, resp. The two methods are comparable for detecting lesions of the proximal small intestine; both include the kinetics of the appearance and disappearance of sugar in the extracellular. The first method is advantageous in that it requires only two blood measurements; however, it does require complex calculations.

6325 ENDOSCOPIC POLYPECTOMY OF THE JEJUNUM. (Eng.) Montori, A.; Viceconte, G.; Miscusi, G.; Viceconte, G. W.; Pastorino, C. (3rd Surgical Clinic, Rome Univ., Digestive Endoscopy Center, Italy). *Endoscopy* 7(4):249-250; 1975.

The case of a 44-yr-old man in whom endoscopic polypectomy for the removal of a jejunal lipoma was successfully performed is presented. A Billroth II gastric resection for duodenal ulcer had previously been performed in the patient. He presented with intestinal obstruction, and an x-ray revealed a tumor situated about 20 cm from the anastomosis in the efferent loop. The polyp, which later proved to be a fibrolipoma, was removed with a diathermic snare, using a panendoscope. The patient made an uneventful recovery.

6326 ARTERIOGRAPHIC DEMONSTRATION AND COLONOSCOPIC REMOVAL OF A BLEEDING JUVENILE POLYP. (Eng.) Stillman, A. E.; Long, P.; Komar, N. N. (Tucson Medical Center, Tucson, AZ). *J. Pediatr.* 88(3):445-446; 1976.

The case of an 8-yr-old boy in whom a bleeding polypoid lesion was demonstrated by mesenteric arteriography and removed transcolonoscopically is reported. The patient presented with rectal bleeding. The rectal examination was normal. At sigmoidoscopy, large quantities of blood were seen descending from above the reach of the sigmoidoscope (22 cm), and at least 300 ml of blood were aspirated during the procedure. Mesenteric arteriography was performed immediately, and this revealed a polypoid lesion in the mid-descending colon. The bleeding stopped shortly after arteriography. The polyp was successfully removed using electrocautery via colonoscopy. This case demonstrates that under selected conditions, transcolonoscopic polypectomy may assist in the management of pediatric patients with polypoid lesions.

6327 RADIOGRAPHIC EVALUATION OF PANCREATICOJEJUNAL SHUNTS. (Eng.) Miller, E. W.; Goldberg, H. I.; Goldberg, S. B.; Shapiro, H. (750 Las Gallinas Ave., San Rafael, CA 94903). *Scand. J. Gastroenterol.* 1(2):439-443; 1976.

A postsurgical radiographic evaluation of pancreaticojejunal shunts was performed in two patients using a fiberoptic panendoscope with retrograde injection via the ampulla of Vater. The first patient was a 34-yr-old man with a long history of drug abuse and of alcoholism. An endoscopic retrograde cholangiopancreatography (ERCP) was performed, which revealed a massively dilated main pancreatic duct and side branches typical of chronic pancreatitis. A pancreaticojejunostomy with Roux-en-Y jejunojejunostomy and a cholecystectomy were performed. Five months later, there was a recurrence of upper abdominal distress, and a repeat panendoscopy with ERCP was carried out. Injection of contrast medium rapidly filled a dilated, ectatic ductal system. The contrast medium entered the jejunal loop and readily spilled from the pancreatic duct into the jejunum through the Roux-en-Y anastomosis. The recurrence of the patient's symptoms was found to be due to a resumption of drinking, and the patient was instructed to stay away from alcohol entirely. The second patient, a 49-yr-old woman with a long history of chronic pancreatitis, presented with severe abdominal pain. A partial resection of the body and tail of the pancreas was carried out with a pancreaticojejunostomy and a Roux-en-Y jejunum-to-jejunum drainage. One year later, an ERCP was performed because of pain and weight loss. The contrast medium filled the pancreatic ducts satisfactorily, but the main pancreatic duct appeared moderately dilated, and there was a narrowing at the pancreaticojejunal anastomosis. Total pancreatectomy, choledochojejunostomy, and a revision of the Roux-en-Y jejunal anastomosis were performed, and the patient improved. The results in both cases show the value of endoscopy and retrograde injection of the pancreatic duct.

6328 USE OF A STEERABLE CATHETER FOR INTUBATING PATIENTS WITH ZENKER'S DIVERTICULUM. (Eng.) Doods, W. J.; Miller, W. N.; Hogan, W. J.; Stewart, E. T.; Arndorfer, R. C. (Milwaukee County Medical Complex, 8700 West Wisconsin Ave., Milwaukee, WS 53226). *Am. J. Dig. Dis.* 21(1):47-48; 1976.

Because esophageal or gastric intubation attempts often fail in patients with Zenker's diverticulum, a steerable-catheter technique was developed and is described. During fluoroscopy, the soft steerable catheter (which can be manipulated by a control handle connected to 4 longitudinal wires embedded in the catheter wall) tip is aligned with the upper esophageal sphincter and is subsequently advanced into the cervical esophagus. Following esophageal catheterization, a guide wire is passed through the catheter into the distal esophagus or stomach. After removal of the steerable catheter, any type of tube may be passed over the guide wire into the esophagus. This technique was successfully used in six patients with Zenker's diverticulum in whom the conventional methods for placing a manometric tube in the esophagus were unsuccessful. The tube was positioned in less than 10 min, and the procedure was well tolerated. This method may also be used for negotiating the lower esophageal sphincter in achalasia patients with a tortuous megaesophagus.

6329 THE VALUE OF THE LEUKOCYTE COUNT IN THE DIAGNOSIS OF ACUTE APPENDICITIS. (Eng.) Raftery, A. T. (Leeds General Infirmary, Leeds, England). *Br. J. Surg.* 63(2):143-144; 1976.

To determine the value of the WBC count in the diagnosis of acute appendicitis, total and differential WBC counts were performed on 175 patients with a provisional diagnosis of acute appendicitis. Ninety-six percent of 106 patients with acute appendicitis had either an abnormal total or differential WBC count (>10,000 mm^3). Four of 24 patients operated on with a normal count had acute appendicitis. It is concluded that leukocytosis of above 10,000 mm^3 or a differential in excess of 75% neutrophils supports the clinical diagnosis of acute appendicitis and that routine estimation of the WBC count is a useful investigation. While a normal count does not exclude even a perforated appendicitis, such a count should prompt further review of the diagnosis, especially in the presence of an atypical history or minimal physical signs.

6330 DOUBLE CONTRAST BARIUM MEAL EXAMINATION—A COMPARISON OF TECHNIQUES FOR INTRODUCING GAS. (Eng.) James, W. B.; McCreath, G.; Sutherland, G. R.; McDonald, M. (Southern General Hosp., Glasgow, Scotland). *Clin. Radiol.* 27(1): 99-101; 1976.

A comparison between techniques for introducing additional gas to the stomach for double contrast barium examination was made in 250 patients. The patients were divided into five groups and received one of the following treatments: one teaspoon effervescent powder; 60-100 ml tonic water; 15-20 effervescent tablets; transnasal intubation of 100-150 ml of air; or no treatment, but swallowed air. The administration of effervescent tablets was associated with significant improvement in gastric mucosal coating ($p<0.05$) and significantly less bubble formation ($p<0.01$). The effervescent powder was associated with significantly greater bubble formation ($p<0.01$). Effervescent tablets appear to be the method of choice for introducing gas into the stomach in double contrast barium meal examinations.

6331 A NEW RADIOISOTOPIC TECHNIC FOR THE MEASUREMENT OF GASTRIC EMPTYING TIME OF SOLID MEAL. (Eng.) Chaudhuri, T. K.; Greenwald, A. J.; Heading, R. C.; Chaudhuri, T. K. (Hampton Veterans Admin. Hosp., Hampton, VA 23667). *Am. J. Gastroenterol.* 65(1):46-51; 1976.

The suitability of using technetium-99m-diethylene triamine penta-acetic acid (^{99m}Tc) chelate as a marker in determining the gastric emptying rate of a solid meal was tested in four dogs, eight normal human subjects, and *in vitro*. In addition, a standard value for normal gastric emptying, $T_{1/2}$ of solid meal, was established using this substance and a gamma camera-computer system. In dogs fed ^{99m}Tc in 250 ml of normal saline, about 0.5% of the radioactivity was recovered from the total blood and urine, and about 0.1% was recovered from the thyroid and kidneys. Approximately 96% of the administered radioactivity was retrieved from the gastrointestinal content. The stomach had only about 1% activity. These results indicate insignificant absorption and adsorption of ^{99m}Tc. The urine and blood activity (<0.5%) in human subjects also revealed insignificant absorption of ^{99m}Tc. To assess the adsorbability of ^{99m}Tc to the test meal (cornflakes), a mixture of cornflakes, milk, ^{99m}Tc, and human gastric juice was centrifuged, and the supernatant was counted for radioactivity. About 20% of the radioactivity was left over in the supernatant, in comparison with 40% in a similar experiment using ^{51}Cr-sodium chromate. These results indicate less adsorption of ^{51}Cr to cornflakes, which is not desirable. Using the gamma camera computer system, the gastric activity in % in the stomachs of human volunteers after ingesting the test meal plus 500 µCi of ^{99m}Tc could be plotted against time on semilog paper. The $T_{1/2}$ of a radiolabeled solid meal from the stomach was calculated and was found to be a mean of 37 min. The gastric emptying curve was monoexponential, at least for the first 60 min. The $T_{1/2}$ in this study is lower than those reported in other studies (56, 70, and 68 min). The difference may be explained by differences in the technique, radioisotope, and meal composition. ^{99m}Tc appears to be a suitable marker for gastrointestinal studies.

6332 EFFECT OF NICOTINE ON THE PRODUCTION OF GASTRIC ACID. (Ger.) Mertz, D. P.; Thongbhoubesra, T. (Kurklinik am Park, 4934 Bad Meinberg 2, Postfach 2129, W. Germany). *Med. Klin.* 71(4):147-155; 1976.

The effect of nicotine on the ionic composition and amount of gastric secretion during maximal or submaximal acid stimulation was explored in smokers and nonsmokers. The subjects included 20 fasting men, 27-58 yr old, and 5 fasting women, 33-50 yr old. Submaximal stimulation was elicited by betazole (50 mg/hr, i.v.) in 13 persons (group A), and maximal stimulation was elicited by betazole (2 mg/kg/hr, i.v.) in 12 persons (group B). After secretory baselines were established, nicotine hydrogen hydrate was administered in the following doses: 0.012-0.020 mg/kg to seven nonsmokers in group A, 0.022-0.034 mg/kg to six smokers in group A, 0.018-0.032 mg/kg to seven nonsmokers in group B, and 0.033-0.048 mg/kg to five smokers in group B. These doses are above the threshold, but well below toxicity. The concentration of all electrolytes in group A changed significantly. H^+ and Cl^- rose an average 7% and 5%, resp., over base levels. The concentration of Na^+ and K^+ fell an average 21% and 9%, resp. Differences between smoker and nonsmoker responses in group A were insignificant. The rate of gastric juice and ion secretion was unaffected by nicotine in groups A and B. In group B, H^+ increased 5% and K^+ decreased 7%; Na^+ and Cl^- were unchanged, on the average. The secretory rate of H^+ also rose. Various clinical and experimental outcomes of nicotine-induced elevations in gastric acidity and consequent embarrassment of the mucosal barrier are reviewed.

6333 PERORAL STAINING METHOD WITH TOLUIDINE BLUE AS AN AID IN THE DIAGNOSIS OF MALIGNANT GASTRIC LESIONS. (Eng.) Giler, S.; Kadish, U.; Urca, I. (Beilinson Medical Center, Petah Tiqva, Israel). *Am. J. Gastroenterol.* 65(1):37-40; 1976.

The accuracy of the toluidine blue staining method in the diagnosis of malignant gastric lesions was evaluated in 42 patients with suspected lesions. Following removal of gastric mucus, the mucosa was exposed to the action of the dye by having the patients drink 500 ml of acetate buffer containing 16-20 mg of chymotrypsin. Toluidine blue (500 mg) was then administered in capsule form. Twenty-four hours later, endoscopy was performed. Thirty-three patients were operated upon after second staining. Of these 33, 18 had malignant lesions. Positive staining was recorded in 15 of them. Ten of 11 malignant tumors and 5 of 7 ulcers with malignant changes were stained. Only 1 of 13 benign lesions showed positive staining. Of the three unstained malignant lesions, two occurred in the only two patients who vomited the dye immediately following administration. The results indicate that the use of toluidine blue staining prior to endoscopy might be helpful in demonstrating minute malignant lesions of the gastric mucosa and in determining the most likely site for obtaining a positive biopsy. It can also be helpful in the differential diagnosis of benign and malignant ulcers in the stomach.

6334 DEMONSTRATION OF EROSIVE GASTRITIS BY THE DOUBLE-CONTRAST TECHNIQUE. (Eng.) Poplack, W.; Paul, R. E.; Goldsmith, M.; Matsue, H.; Moore, J. P.; Norton, R. (Tufts-New England Medical Center Hosp., 171 Harrison Ave., Boston, MA 02111). *Radiology* 117(3):519-521; 1975.

Experience with the routine use of a pharmacologically-aided double-contrast (PDC) method of roentgenographic visualization for the detection of superficial gastric erosions is presented. The patient receives 0.5 mg of glucagon, i.v., and then ingests 30 ml of barium. Approximately 4 g of gas-releasing powder, followed immediately by 8 ml of water containing a silicone antifoaming agent, is administered p.o. The prone patient is turned side to side to coat the anterior mucosal wall, and spot films are taken. The patient is placed upright, receives an additional 207 ml of barium, and is placed in the supine position for additional films. Among 1,800 upper gastrointestinal examinations, changes characteristic of erosive gastritis were seen in 10 patients. In six cases, endoscopy clearly confirmed the diagnosis. In all cases, the central punctate barium collections were superimposed on edematous nodules of gastric mucosa, either grouped in small clusters or isolated to form small, relatively flat polypoid lesions. It appears that erosive gastritis is more common than generally believed. The diagnosis requires relaxation of the stomach and demonstration of fine mucosal relief by the double-contrast technique.

6335 RESIDUAL BILIARY CALCULI: DISPERSAL BY IRRIGATION OF COMMON BILE DUCT. (Eng.) Mackie, B.; Frachowiak, R. S. J.; Cembala, J. A. (Salisbury General Hosp., Salisbury SP2 7SX, England). *Br. Med. J.* 4(5999):737-738; 1975.

A recently developed washout technique for the dispersal of residual biliary duct calculi is described, and the case reports of two patients in whom it was successfully used are presented. Before starting the procedure, bile is cultured and, if infected, the patient is given the appropriate antibiotic. The washout is performed by connecting the T-tube to 1 liter of sterile 0.9% saline, to which 40 ml of 1% lignocaine has been added. Propantheline (15 mg bromide, i.m.) is given 30 min before the start of the irrigation. T-tube choledochogram showed no evidence of calculi after this procedure in the two patients; in both patients, the residual stones had been located in the lower end of the duct. The evidence supports the argument that nonsurgical procedures have a significant place in the management of patients with residual stones, particularly if they are in the lower portion of the bile duct.

6336 CLINICAL VALUE OF GASTRIN DETERMINATION. (Pol.) Zaborowski, P.; Grabowski, T.; Bogoniowska, Z. (IV Kliniki Chorob Wewnetrznych Instytutu Medycyny Wewnetrzneg WAM, 04-349 Warsaw, ul. Szaserow 128, Poland). *Pol. Tyg. Lek.* 31(25): 1061-1063; 1976.

6337 GASTRIC ACID AND PLASMA GASTRIN LEVELS IN CERTAIN GASTROPATHIES. (Ita.) Quatrini, M.; Mortara, G.; Ranzi, T.; Bianchi, P. (Istituto di Clinica Medica I dell'Univ., Milan, Italy). *Minerva Gastroenterol.* 22(1):14-17; 1976.

6338 PENTAGASTRIN TEST: CLINICAL CORRELATIONS IN 400 PATIENTS. (Fre.) Giroux, Y.; Bessette, G.; Archambault, A. (Hopital Maisonneuve-Rosemont, 5415, boulevard de l'Assomption, Montreal, P.Q., HIT 2M4, Canada). *Rev. Fr. Gastroenterol.* (120):39-54; 1976.

6339 ENDOSCOPY IN GASTROINTESTINAL HEMORRHAGES. (Rus.) Lutsevich, E. V.; Belov, I. N.; Struchkov, Yu. V. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (5):80-85; 1976.

6340 PERITONEOSCOPY IN A SURGICAL CLINIC. (Rus.) Trofimov, V. M. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Khirurgiia (Mosk.)* (7):39-44; 1975.

6341 VALUE OF ARTERIOGRAPHY IN HEMORRHAGES OF THE DIGESTIVE TRACT. (Fre.) Bigot, J. M.; Liguory, C. (No affiliation given). *Med. Chir. Dig.* 5(2):104-105; 1976.

6342 THE USE OF GLUCAGON FOR ENDOSCOPIC AND RADIOLOGICAL EXAMINATION OF THE GASTROINTESTINAL TRACT. (Ger.) Paul, F.; Freyschmidt, J. (Zentrum fur Innere Medizin, Klinikum der Justus-Liebig-Universitat, Rodthohl 6, 6300 Giessen, W. Germany). *Fortsch. Geb. Roentgenstr. Nuklearmed.* 125(1):31-37; 1976.

6343 SUBTRACTION IN GASTROINTESTINAL ANGIOGRAPHY. (Fre.) Clement, J. P.; Burelle, H.; Colleter, J. F.; Corbeau, A. (Hopital Sainte-

Marguerite, boulevard de Sainte-Marguerite, F 13009 Marseille, France). *J. Radiol. Electrol. Med. Nucl.* 57(6/7):539-544; 1976.

6344 SOURCES OF ACUTE HEMORRHAGE FROM THE UPPER PART OF THE GASTROINTESTINAL TRACT. (Ger.) Wusthoff, D.; Keitel, K.; Heck, J. (Klinikum Barmen der Stadt Wuppertal, Medizinische Klinik, Heusnerstrasse 40, 56 Wuppertal 2. W. Germany). *Med. Welt* 26(38):1717-1718; 1975.

6345 THE ACTIVITY OF SMALL INTESTINE MUCOSA DISACCHARIDASES IN CONFRONTATION WITH HISTOLOGICAL FINDINGS. (Pol.) Chrostowski, K.; Butruk, E.; Orlowska, J. (Zaklad Chemii Klinicznej Instytutu Gruzlicy, 01-138 Warsaw, ul. Plocka 26, Poland). *Pol. Tyg. Lek.* 31(24):1013-1016; 1976.

6346 COMPARATIVE STUDIES OF THE STOMACH AND DUODENUM WITH BUSCOLYSIN AND CERUCAL. (Ger.) Conrad, G.; Schmidt, R. (Radiol. Abt. Poliklinik, Karl-Marx-Strasse, 55 Nordhausen, E. Germany). *Z. Gesamte Inn. Med.* 31(11):377-382; 1976.

6347 DOUBLE DENSITY OF THE STOMACH LESSER CURVATURE: ONE FINDING IN CARCINOMA OF THE BODY AND TAIL OF THE PANCREAS. (Jpn.) Watanabe, T.; Ohhata, T. (Medical School, Shinshu Univ., Japan). *Jpn. J. Clin. Radiol.* 20(13):1141-1147; 1975.

6348 THE FSA REACTION IN EARLY DETECTION AND DIFFERENTIAL DIAGNOSIS OF GASTRIC CANCER. A REVIEW. (Fin.) Hakkinen, I. (Turun yliopiston patologisen anatomian laitos, 20520 Turku 52, Finland). *Duodecim* 92(1):6-12; 1976.

6349 GASTROSCOPY WITH GASTRIC BIOPSY IN 50 PATIENTS WITH CARCINOMA OF THE STOMACH RADIOLOGICALLY PROBABLE OR CERTAIN. (Fre.) Blanc, D.; Boulenger, F.; Preel, J.-L.; Hardouin, J.-P. (Hopital Louis-Mourier, F 92701 Colombes Cedex, France). *Arch. Fr. Mal. App. Dig.* 65(3):201-208; 1976.

6350 RADIOLOGICAL INVESTIGATION IN THE EARLY DIAGNOSIS OF CANCER OF THE STOMACH. (Ita.) Luzzatti, G. (Istituto di Radiologia, Osp. Magg. S. Carlo Borromeo, Milan, Italy). *Minerva Gastroenterol.* 22(1):22-35; 1976.

6351 DIAGNOSTIC SIGNIFICANCE OF INTUBATION WITH ACID LOAD FOR DETERMINATION OF THE NATURE OF ACHLORHYDRIA. (Rus.) Saakyan, A. G.; Makarova, L. A. (Pyatigorsk Scientific Res. Inst. Balneology and Physiotherapy, Pyatigorsk, USSR). *Klin. Med. (Mosk.)* 54(3):33-38; 1976.

6352 LDH ISOENZYMES AND GASTRIN IN ACHLORHYDRIA. (Ger.) Mohamedi, S.; Penner, E.; Brunner, H.; Sinzinger, H.; Pietschmann, H. (II. Medizinische Universitatsklinik, Garnisongasse 13, A-1090 Vienna, Austria). *Wien. Klin. Wochenschr.* 88(14):458-460; 1976.

6353 CLINICAL SIGNIFICANCE OF GLUTAMYL TRANSPEPTIDASE. (Ger.) Forster, H.; Lenschen, J.; Fritsch, W.-P.; Hausamen, T.-U.; Rick, W. (I. Med. Univ.-Klinik A. Moorenstr. 5, 4 Dusseldorf, W. Germany). 26(37):1642-1644; 1975.

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6362 COMPARATIVE STUDY OF LIPOPROTEIN X AND LEUCINE AMINOPEPTIDASE IN THE DIAGNOSIS OF CHOLESTASIS. (Spa.) Frison, J. C.; Ras, M. R.; Rubies-Prat, J.; Moga, I.; Caralps, A.; Masdeu, S.; Bacardi, R. (Ciudad Sanitaria de la Seguridad Social, Universidad Autonoma, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(4):457-464; 1976.

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6374 X-RAY CONTRAST INVESTIGATION OF PANCREATIC DUCTS IN SURGERY OF THE PANCREATOBILIARY SYSTEM. (Rus.) Blagovidov, D. F.; Danilov, M. V.; Sokolov, L. K.; Malkerova, N. N.; Mazaev, A. P.; Glabai, V. P. (A. V. Vishnevskii Inst. Surgery, USSR Acad. Medical Sciences, Moscow, USSR). *Vestn. Khir.* 226(4):46-51; 1976.

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Medicina Nucleare, Ospedale Maggiore "Ca Grande," Milan, Italy). *Minerva Gastroenterol.* 22(1):97-103; 1976.

6379 SPLENOPORTOGRAPHY IN BUDD-CHIARI SYNDROME. (Fre.) Gilsanz, V.; Estrada, R. V.; Barrio, E.; Ispizua, I. (Hospital Clinico de San Carlos, Facultad de Medicina, Madrid, Spain). *Med. Chir. Dig.* 5(2):93-94; 1976.

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See also, 6397, 6405, 6406, 6408, 6424, 6425, 6432, 6448, 6465, 6466, 6484, 6486, 6487, 6488, 6489, 6490, 6496, 6497, 6517, 6529, 6534, 6542, 6554, 6569, 6571, 6572, 6583, 6592, 6600, 6603, 6617, 6626, 6635, 6637, 6658, 6680, 6691, 6693, 6696, 6789, 6793, 6794, 6816, 6820, 6828, 6857, 6860, 6874, 6876, 6877, 6898.

GASTROINTESTINAL DISEASES

ESOPHAGUS

6381 RETROGRADE OESOPHAGOSCOPY VIA GASTROSTOMY. (Eng.) Hentschel, E.; Dittrich, H.; Weiss, W. (First Med. Dept., Hanusch-Krankenhaus, Vienna, Austria). *Endoscopy* 8(1):38-40; 1976.

The case of a patient in whom a benign stenosing esophagitis was diagnosed using retrograde esophagoscopy via a gastrostomy is presented. The patient, a 66-yr-old woman with an esophageal diverticulum, presented with vomiting. An x-ray examination showed a widened esophagus; the cardiac orifice was closed by a stenosing process. An exact diagnosis was difficult because of stasis of food, and barium did not pass into the stomach. The introduction of a fiberscope failed because the patient did not cooperate, and rough manipulation with the instrument could not be carried out because of the diverticulum in the upper esophagus. A gastrostomy was performed to prepare the patient for stenosis removal by intensive enteral and parenteral nourishment. Eight days later, a fiberscope was introduced into the stomach through the gastrostoma. A severely inflamed mucosa with peptic ulcerations and necrosis was seen about 1 cm above the cardiac orifice. No signs of malignancy were found.

6382 TRANSHEPATIC EMBOLIZATION OF ESOPHAGEAL VARICES. (Fre.) Doyon, D.; Mouzon, A.; Vadrot, D.; Franco, D.; Bismuth, H. (Hopital de Bicetre, 78, avenue du General-Leclerc, 94270 Kremlin-Bicetre, France). *J. Radiol. Electrol. Med. Nucl.* 56(12):917-921; 1975.

A technique for the embolization of the gastric coronary vein and posterior gastrics is described for arresting hemorrhage from the esophageal varices. The technique is recommended for cirrhotic patients when the presence of hepatic insufficiency contraindicates a portal by-pass operation. Embolization is carried out by injecting fragments of Songel, followed by injection of a mixture of coagulants (Thrombase and Hemocaprol). The liver is punctured with the patient anesthetized, and the coronary vein approached by the transportal system or the umbilical vein (under radiographical control). Failure may occur as a result of an unfavorable anatomical disposition of the coronary vein. Case reports of two of six successful embolizations in hemorrhaging patients, are included. No complications occurred in any of the cases.

6383 RETURN OF ESOPHAGEAL PERISTALSIS IN IDIOPATHIC ACHALASIA. (Eng.) Mellow, M. H. (Coll. Physicians Surgeons, Columbia Univ., New York, NY). *Gastroenterology* 70(6):1148-1151; 1976.

The response of a 54-yr-old man with idiopathic achalasia to multiple doses of a direct-acting cholinergic agent was compared to that of eight other achalasia patients and eight controls. Achalasia had been diagnosed 7 yr previously, and pneumatic dilation had provided a good clinical response. At 7-yr follow-up, features considered typical of achalasia were no longer present, and a return of peristaltic activity throughout most of the body of the esophagus was seen. The subject, controls, and achalasia patients received three doses of bethanechol (1, 1, and 2 mg, s.c., at 5-min intervals). The maximal lower esophageal sphincter (LES) pressure recorded was used as the LES pressure response to each dose. The LES response of the subject and the controls differed significantly from that seen in the achalasia patients ($p<0.01$ at each dose). The mean percentage of relaxation in the subject under baseline conditions was 54%. The percentage of relaxation with swallowing was unaltered after bethanechol (47, 53, and 41% at each dose). Administration of bethanechol resulted in a sustained intraesophageal pressure increase to greater than 25 mm Hg in all achalasia patients. Neither the controls nor the subject had an intraesophageal pressure increase. The response of the subject represents the first reported case of the return of esophageal peristalsis in idiopathic achalasia.

6384 POSITION OF THE DISTAL ESOPHAGEAL SPHINCTER AND ITS RELATIONSHIP TO REFLUX. (Eng.) DeMeester, T. R.; Johnson, L. F. (Univ. Chicago, Pritzker Sch. Medicine, Chicago, IL). *Surg. Forum* 26:364-366; 1975.

6385 TWENTY-FOUR-HOUR LOWER ESOPHAGEAL pH MONITORING AND THE LOWER ESOPHAGEAL SPHINCTER. (Eng.) Clark, J.; DeMeester, T. R.; Johnson, L. F.; Skinner, D. B. (Univ. Chicago, Pritzker Sch. Medicine, Chicago, IL). *Surg. Forum* 26:362-363; 1975.

6386 MUCOSAL RESPONSE TO ESOPHAGEAL MOTOR DISORDERS. (Eng.) Pope, C. E., II (Veterans Admin. Hosp., 4435 Beacon Ave. So., Seattle, WA 98108). *Arch. Intern. Med.* 136(5):549-555; 1976.

6387 OESOPHAGEAL MOTOR CHANGES IN SYSTEMIC DISEASE. (Eng.) Atkinson, M. (No affiliation given). *Clin. Gastroenterol.* 5(1):119-134; 1976.

6388 DIFFUSE MUSCLE SPASM OF THE OESOPHAGUS AND THE HYPERTENSIVE LOWER OESOPHAGEAL SPHINCTER. (Eng.) Vantrappen, G.; Hellemans, J. (No affiliation given). *Clin. Gastroenterol.* 5(1):59-72; 1976.

6389 MOTOR FUNCTION AND DYSFUNCTION OF THE ESOPHAGUS AND PHARYNX. (Eng.) Goyal, R. K. (Univ. Texas Southwestern Medical Sch., 5323 Harry Hines Blvd., Dallas, TX 75235). *Arch. Intern. Med.* 136(5):511-514; 1976.

6390 ABDOMINAL PAIN, VOMITING, FEVER AND PLEURAL EFFUSION. (Eng.) Cryer, P. E.; Kissane, J. (Washington Univ. Sch. Medicine, Washington, DC). *Am. J. Med.* 60(1):107-116; 1976.

6391 PATHOPHYSIOLOGY AND CLINICAL PRESENTATION OF ACHALASIA. (Eng.) Earlam, R. (No affiliation given). *Clin. Gastroenterol.* 5(1):73-88; 1976.

6392 MANAGEMENT OF OESOPHAGEAL ACHALASIA. (Eng.) Ellis, F. H., Jr. (No affiliation given). *Clin. Gastroenterol.* 5(1):89-102; 1976.

6393 PRIMARY REPAIR IN ESOPHAGEAL ATRESIA WITH A WIDE GAP BY REHBEIN'S PROCEDURE--REPORT OF A CASE. (Eng.) Ikeda, K.; Suita, S. (2nd Dept. Surgery, Kyushu Univ., 1-1, 3-chome, Maedashi, Higashi-ku, Fukuoka, Japan). *Z. Kinderchir.* 17(2): 173-179; 1975.

6394 LOW BIRTHWEIGHT BABIES WITH OESOPHAGEAL ATRESIA OR TRACHEO-OESOPHAGEAL FISTULA. (Eng.) Cozzi, F.; Wilkinson, A. W. (Dept. Pediatric Surgery, Children's Hosp., Univ. Rome, Rome, Italy). *Arch. Dis. Child.* 50(10):791-795; 1975.

6395 CONGENITAL H-TYPE TRACHEO-OESOPHAGEAL FISTULA. (Eng.) Sundar, B.; Guiney, E. J.; O'Donnell, B. (Columbus Hosp., 2520 North Lakeview Ave., Chicago, IL 60614). *Arch. Dis. Child.* 50(11):862-863; 1975.

6396 BOERHAAVE'S SYNDROME: ROLE OF ESOPHAGOSCOPY. (Eng.) Curtis, D. L.; Burbige, E. J.; Milligan, F. D. (Dept. Medicine, Johns Hopkins Univ., Baltimore, MD). *Gastrointest. Endosc.* 22(4):208-209; 1976.

6397 EARLY RADIOGRAPHIC MANIFESTATIONS OF CARCINOMA OF THE ESOPHAGUS. (Eng.) Koehler, R. E.; Moss, A. A.; Margulis, A. R. (Univ. California Sch. Medicine, San Francisco, CA 94143). *Radiology* 119(1):1-6; 1976.

6398 THE OCCURRENCE OF BACTEREMIA AFTER ESOPHAGEAL DILATION. (Eng.) Raines, D. R.; Branche, W. C.; Anderson, D. L.; Boyce, H. W., Jr. (Walter Reed Army Medical Center, Washington, DC). *Gastrointest. Endosc.* 22(2):86-87; 1975.

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6400 SOME ASPECTS OF THE EPIDEMIOLOGY OF ESOPHAGEAL CANCER. (Eng.) Day, N. E. (Intl. Agency Res. Cancer, Lyon, France). *Cancer Res.* 35(11):3304-3307; 1975.

6401 DIETARY FACTORS AND ESOPHAGEAL CANCER IN THE CASPIAN LITTORAL OF IRAN. (Eng.) Hormozdiari, H.; Day, N. E.; Aramesh, B.; Mahboubi, E. (Food Nutrition Inst., Teheran, Iran). *Cancer Res.* 35(11):3493-3498; 1975.

6402 DISCRIMINATORY VALUE OF SYMPTOMS IN THE DIFFERENTIAL DIAGNOSIS OF DYSPHAGIA. (Eng.) Edwards, D. A. W. (No affiliation given). *Clin. Gastroenterol.* 5(1):49-58; 1976.

6403 DYSPHAGIA. (Eng.) Bullock, J. (No affiliation given). *Nurs. Times* 71(49): 1928-1930; 1975.

6404 BILIARY REFLUX AND ESOPHAGITIS IN SLIDING HIATAL HERNIA. (Eng.) Rovati, V.; Foschi, D. (Dept. Surgical Pathology, Univ. Milan, Milan, Italy). *Abdom. Surg.* 18(2):44-47; 1976.

6405 DOUBLE LUMEN ESOPHAGUS DUE TO REFLUX ESOPHAGITIS WITH FIBROUS SEPTUM FORMATION. (Eng.) Mihas, A. A.; Slaughter, R. L.; Goldman, L. N.; Hirschowitz, B. I. (Dept. Medicine, Univ. Alabama, Birmingham, AL 35294). *Gastroenterology* 71(1):136-137; 1976.

6406 RADIOGRAPHIC FINDINGS IN HERPETIC ESOPHAGITIS. (Eng.) Meyers, C.; Durkin, M. G.; Love, L. (Loyola Univ. Sch. Medicine, Maywood, IL 60153). *Radiology* 119(1):21-22; 1976.

6407 TREATMENT OF REFLUX ESOPHAGITIS RESULTING IN MASSIVE ESOPHAGEAL BLEEDING. (Eng.) Safaie-Shirazi, S.; Hardy, B. M. (Univ. Hosp., Iowa City, IA 52242). *Arch. Surg.* 111(4):365-367; 1976.

6408 PATHOLOGY OF REFLUX OESOPHAGITIS. (Eng.) Thompson, H. (No affiliation given). *Clin. Gastroenterol.* 5(1):143-154; 1976.

6409 CONSEQUENCES OF GASTRO-OESOPHAGEAL REFLUX. (Eng.) Hendrix, T. R.; Yardley, J. H. (No affiliation given). *Clin. Gastroenterol.* 5(1): 155-174; 1976.

ESOPHAGUS

6410 A PATIENT WITH KARTAGENER AND PATERSON-BROWN-KELLY SYNDROMES. (Eng.) Todd, N. W., Jr.; Yodaiken, R. E. (Phoenix Indian Medical Center, 4212 N. 16th St., Phoenix, AZ 85016). *JAMA* 234(12):1248-1250; 1975.

6411 REFLUX ESOPHAGITIS. (Eng.) Dodds, W. J.; Hogan, W. J.; Miller, W. N. (Milwaukee County Medical Complex, 8700 West Wisconsin Ave., Milwaukee, WS 53226). *Am. J. Dig. Dis.* 21(1):49-67; 1976.

6412 SPONTANEOUS PERFORATION OF THE CERVICAL ESOPHAGUS. (Eng.) Bradham, R. R.; deSaussaure, C.; Lemel, A. L. (Roper Hosp., Charleston, SC). *Arch. Surg.* 111(3):284-285; 1976.

6413 THE PATHOLOGY OF ESOPHAGEAL INTRAMURAL PSEUDODIVERTICULOSIS. (Eng.) Umlas, J.; Sakhuja, R. (Mount Auburn Hosp., 330 Mount Auburn St., Cambridge, MA 02138). *Am. J. Clin. Pathol.* 65(3):314-320; 1976.

See also, 6160, 6303, 6328, 6438, 6516, 6548, 6792.

STOMACH

6414 A HIGH-POWER GASTRIC PHOTOCOAGULATOR FOR FIBEROPTIC ENDOSCOPY. (Eng.) Auth, D. C.; Lam, V. T. Y.; Mohr, R. W.; Silverstein, F. E.; Rubin, C. E. (Center Bioengineering, Univ. Washington, Seattle, WA 98195). *IEEE Trans. Biomed. Eng.* 23(2):129-135; 1976.

A fiberoptic delivery system for gastric photocoagulation is described. The system is usable with any conventional gastric or colonic fiberendoscope and can be readily inserted in the biopsy channel of an *in vivo* scope. The photocoagulator uses a water-cooled argon laser, along with a step-index cylindrical quartz-glass fiber-optical waveguide, and is capable of depositing in excess of 9 watts of continuous laser radiation at the site. The system was used to control experimentally produced gastric bleeding in 10 dogs, and acid-induced lesions of about 1 cm^2 were successfully controlled. The typical process of photocoagulation consisted of several 1 sec bursts of light of approximately 10 watts input laser power. With the aid of a synchronized filter to attenuate the laser radiation, the endoscopist can administer the pulses of light to the gastric mucosa while observing the progress of coagulation.

6415 THE EFFECT OF A PEPSIN-INHIBITION PENTAPEPTIDE ON THE SECRETION OF PEPSIN AND HYDROCHLORIC ACID IN THE STOMACH. (Dan.) Svendsen, L. B.; Guldager, N.; Christiansen, P. M. (Jenslovs Tvaervej 20, 4th, DK-2920 Charlottenlund, Denmark). *Ugeskr. Laeger* 137(39):2267-2269; 1975.

The effects of pepsin-inhibiting pentapeptide (PIP) on the production of pepsin and hydrochloric acid in the stomach were investigated in nine men with ulcers and high acid secretion. PIP (50 mg) was administered to 12-hr fasted patients. One hr later, the entire contents of the stomach were aspirated, and the patients were given 300 ml bouillon. The stomach contents were again aspirated, and PIP was repeated. Analyses of stomach fluid were taken every 15 min during this regimen. Control patients followed the same regimen, but were given placebo. Pepsin activity was found to be reduced by 72% within 15 min of ingestion of the drug, and by an additional 22% thereafter. After the meal, pepsin activity was reduced 100%, and remained at that level for at least an hour. For the controls, both administrations resulted in about a 36% reduction in pepsin activity within 15 min, and a subsequent return to normal levels. Stomach acidity was not significantly affected by the drug, which has no known side effects. These results confirm those previously reported from Japan. PIP should be further investigated to determine its clinical effect in ulcer disease.

6416 INTRAMURAL GASTRIC ABSCESS. (Eng.) Murphy, J. F.; Graham, D. Y.; Frankel, N. B.; Spjut, H. J. (Baylor Coll. Medicine, 1200 Moursund Ave., Houston, TX 77030). *Am. J. Surg.* 13(5):618-621; 1976.

Two cases of localized gastric abscess are described, and the pathologic findings are presented. A 59-yr-old man presented with an 11-month history of nausea and abdominal pain. For 2 months prior to hospitalization, he noted pain between the scapulae that could be brought on by lying supine for more than 6 hr and was immediately relieved when he sat up. The upper gastrointestinal series showed no abnormality. Exploratory laparotomy was performed, with the preoperative clinical diagnosis being possible pancreatic carcinoma. Two small nodules were found within the antral wall along the greater curvature. A 25% distal gastrectomy with gastroduodenostomy was performed, and the patient is asymptomatic 7 months after the procedure. A 57-yr-old woman presented with abdominal pain, fever, chills, and nausea. Cholecystitis was suspected. At surgery, a mass was noted in the stomach wall just proximal to the pylorus, and several large immediately adjacent lymph nodes were seen. Hemigastrectomy with gastroduodenostomy was performed, and the patient remains asymptomatic 5 months later. In both patients, the abscesses presented as elevated nodules. They were localized to the submucosa in both cases, and were associated with edema and acute inflammatory cells in the adjacent submucosa and muscularis propria. This was particularly notable in the second case. There was little organization around the abscess in either case. In the second patient, there was microscopic evidence of necrosis of part of the overlying mucosa.

6417 CONGENITAL PYLORIC ATRESIA: REPORT OF A FAMILIAR OCCURRENCE. (Eng.) Olsen, L.; Grotte, G. (Univ. Hosp., S-750 14 Uppsala 14, Sweden). *J. Pediatr. Surg.* 11(2):181-184; 1976.

An instance of familial pyloric atresia in two siblings is reported. The first child, a girl, was the first child of a healthy 26-yr-old woman, whose pregnancy was normal, apart from polyhydramnios. The Apgar score was 6 at 1 min after birth. The child had several aspirations during the first day of life and developed atelectasis and pulmonary infiltrations, shown on x-ray. Hyperbilirubinemia developed, and an exchange transfusion was performed. Atresia in the pyloric region was found at surgery, and a gastrojejunostomy was performed. Continued respiratory problems and circulatory failure resulted in death on the 23rd day of life. The second child, a boy, was born 1 yr later. Because the mother also had polyhydramnios, a pyloric atresia was immediately suspected and verified by x-ray. At surgery 1 day after birth, a membrane several millimeters thick was excised, and a gastroduodenostomy was performed. There were no complications, and the child is healthy at 19 months of age. Fifty-nine cases of congenital pyloric atresia have been reported. A familial occurrence has been described in 13 infants in six families.

6418 GASTRIC CANCER: SURVIVAL RATES WITH SPECIAL REFERENCE TO "EARLY GASTRIC CANCER." (Eng.) Kato, K.; Kito, T.; Nakazato, H.; Miyaishi, S.; Yamada, E. (Dept. Surgery, Aichi Cancer Center Hosp., Nagoya, Japan). *Nagoya J. Med. Sci.* 38(1/2):35-42; 1975.

The survival rates of 1,449 patients who underwent laparotomy for gastric cancer are reported, with particular emphasis on the effectiveness of curative gastrectomy. A total of 895 of these patients had a curative gastrectomy (either partial or total with removal of the second group lymph nodes, classified as NX+b). The 5-yr survival rate for these patients was 62.5%; the 5-yr survival for 267 of the 895 patients who had lesions classified as early gastric cancer (carcinoma involved the mucosa and/or submucosa but did not reach the muscularis propria) was 92.7%. Among four patients undergoing noncurative gastrectomy for early gastric cancer, no evidence of recurrence has been seen, despite the fact that these patients had tumor cells at the lines of resection as a result of inadequate resection. The reason for this is not clear, but early gastric cancer may behave in a more benign fashion than advanced gastric cancer. Overall it appears that gastrectomy with removal of the second group lymph nodes is adequate for the treatment of early gastric cancer.

6419 SURFACE CARCINOMA (EARLY CARCINOMA) OF THE STOMACH. (Ger.) Gloor, F. (Institut fur Pathologie, Kantonsspital, CH-9006 St. Gallen, Switzerland). *Schweiz. Med. Wochenschr.* 106(1):21-27; 1976.

Eighteen surface carcinomas were found among 284 histologically confirmed gastric carcinoma patients. There were 11 women and 7 men, 32-86 yr of age. The mass was confined to the mucosa in 16 cases and had infiltrated into the submucosa in 2. Staging included five type I, seven type IIc, four type III, and two types IIc and III. Localization was prepyloric in three, antral in six, at the angle in five, on the body in three, and in the cardia in one patient. The area of surface involvement was 1.0-2.0 cm^2 in seven cases, 2.1-5.0 cm^2 in seven, 5.1-6.0 cm^2 in two, and 12.0-16.0 cm^2 in two cases. Six were multicentric. The histology included six signet-ring carcinomas, three well-differentiated adenocarcinomas, five undifferentiated adenocarcinomas, and four mixed carcinomas. Nodal metastases were found in one patient whose primary tumor was a type IIc signet-ring mucosal carcinoma located at the angle. Small carcinomas occurred in two of seven with gastric node involvement. The preoperative diagnosis was established by endoscopic biopsy in 14 patients. Epigastric pain was the most frequent symptom, followed by gastrointestinal bleeding and weight loss. The literature of early gastric carcinoma diagnosis and prognosis is reviewed.

6420 RESULTS FROM THE TREATMENT OF GASTROINTESTINAL LYMPHORETICULOSARCOMAS: 16 CASES. (Fre.) Hollender, L. F.; Meyer, Ch.; Weill-Bousson, M.; Otteni, Fr. (Centre Hospitalier Universitaire, 67000 Strasbourg, France). *Med. Chir. Dig.* 3(5):337-346; 1974.

The epidemiology and histology of lymphoreticulosarcomas of the gastrointestinal system are reviewed together with data on 16 cases. The patients (3 women and 13 men) ranged in age from 33-74 yr (mean age, 52 yr). More than half (9/16) were stage I or II, i.e., the malignancy was localized and situated on one side of the diaphragm. Prognosis depends on the degree of dissemination and on the histology; patients with giant follicular types have a better chance of survival than those with undifferentiated lymphosarcomas. Rarely can the malignancy be diagnosed on the basis of clinical symptoms alone, and radiography is not always conclusive. Endoscopy can also give false results since the lesion is often submucosal. Treatment consists of surgery and radiotherapy since lymphosarcomas are particularly radiosensitive. Chemotherapy was used in addition to surgery in two cases. Survival of 2-3.5 yr was observed for three cases of stage I and II lymphosarcomas of the stomach. When the intestine was the site of the neoplasm, diagnosis was usually delayed until malignancy had evolved to stage III and only 1/7 survived for 2 yr; 2/7 deaths occurred postoperatively. The single case of lymphosarcoma of the colon, a stage II, survived 1 yr.

6421 RELATIONSHIP OF BILE IN THE STOMACH TO GASTRITIS. (Eng.) Goldner, F. H.; Boyce, H. W., Jr. (P.O. box 70652, William Beaumont Army Medical Center, El Paso, TX 79920). *Gastrointest. Endosc.* 22(4):197-199; 1976.

Studies were carried out in 50 patients undergoing gastroscopy for a variety of symptoms to determine whether there is a correlation between the fasting intragastric bile acid concentration and gastritis, the accuracy of the visual judgment of the amount of bile in the stomach, and the reliability of the endoscopic impression of gastritis. All but five patients had intact, nonoperated stomachs. The accuracy of the visual judgment of the amount of bile in the stomach was evaluated by plotting the degree of bile staining against the actual bile acid concentration. Moderate and heavy staining reliably reflected increasing bile acid concentrations ($p<0.01$). A bile acid concentration associated with mild staining was not statistically different from that found in the clear mucous lake ($p>0.05$). The endoscopic diagnosis of a normal stomach was confirmed by normal histology in only 21 of 54 cases. The remainder showed gastritis, sometimes of considerable degree. In contrast, in patients with an endoscopic diagnosis of gastritis, the biopsy confirmed the diagnosis in 28 of 32 cases. By plotting the degree of gastritis versus the bile acid concentration in the stomach, it was apparent that the degree of gastritis bears no relation to the fasting gastric bile acid concentration. Similarly, the postprandial bile acid concentrations in three patients undergoing hourly gastric aspirations for 24 consecutive hours were similar to those determined in specimens obtained from them during gastroscopy in the fasting state. The results suggest that the endoscopic diagnosis of mucosal normalcy should not be accepted without biopsy confirmation and that there may be factors more important than the presence of bile in the etiology of gastritis in patients in whom a bile-stained mucous lake is found.

6422 BILE REFLUX GASTRITIS. ANALYSIS OF FASTING AND POSTPRANDIAL GASTRIC ASPIRATES. (Eng.) Brooks, W. S.; Wenger, J.; Hersh, T. (Emory Univ. Clinic, 1365 Clifton Rd., N.E., Atlanta, GA 30322). *Am. J. Gastroenterol.* 64(4):286-291; 1975.

The pattern of the refluxed bile salt in 11 patients with bile reflux gastritis was investigated, and pH, bacterial cultures, and proteolytic activity were determined. Six patients had undergone Billroth II gastrojejunostomy, while the remaining five had had Billroth I anastomoses. The mean pH values for the two groups were similar: 6.49 ± 0.88 for fasting aspirates and 6.08 ± 0.85 for 2-hr postprandial specimens. The mean bacterial colony count was 1.76×10^7 colonies/cm^3 for the fasting specimens and 1.44×10^7 colonies/cm^3 for the postprandial specimens. The mean total proteolytic activity was 97 ± 59 U for fasting aspirates and 145 ± 61 U for the postprandial samples. An analysis of bile acids was completed on 14 specimens from 9 patients. Taurine and glycine conjugates were present, but with no predominance of either type. Conjugates of chenodeoxycholic acid were present in 13 specimens. Conjugates of deoxycholic acid were detected in 13, and conjugates of cholic acid were found in 12 specimens. Deoxycholic acid was the only free bile acid found in all fasting and postprandial samples. A new addition to the previously proposed pathophysiology of bile reflux gastritis is suggested. Peristomal gastritis may develop as a result of the reflux of duodenal and jejunal contents, leading to progressive loss of parietal cell function and parietal cell mass.

6423 EMOTION-RELATED GASTRITIS. (Eng.) Goldberg, S. J.; Smith, C. L.; Connell, A. M. (Dept. Internal Medicine, Univ. Cincinnati Coll. Medicine, Cincinnati, OH 45267). *Am. J. Gastroenterol.* 65(1):41-45; 1976.

The relation between emotional stress and abnormalities of the gastric mucosa was reviewed in 788 consecutive upper gastrointestinal endoscopies. In 24% of these examinations, either a focal or generalized gastritis was diagnosed. Among the 190 cases of gastritis, 82% appeared to have one or more specific factors or associated lesions predisposing to the abnormal mucosa: alcoholism (96 patients), salicylates (36), gastric ulcer (20), hiatal hernia (9), duodenal ulcer (6), nasogastric tube (9), gastroenterostomy or pyloroplasty (9), nonsalicylate ulcerogenic medication (7), or uremia, Zollinger-Ellison syndrome, chronic lung disease, cerebrovascular accident, pancreatitis, or sepsis (1 patient each). Of the 34 cases in which no contributing factor was evident, 53% had significant documented emotional problems: depression (6 patients), anxiety (5), depression plus anxiety (2), severe situational stress (1), personality disorder (1), chronic schizophrenia (2), and psychosomatic neurosis (1). The indications for endoscopy (dysphagia, abdominal pain, nausea or anorexia, chest pain, hematemesis or melena, abnormal upper gastrointestinal series, anemia or guaiac positive stool, and vomiting) were similar in both the emotion-related and non-emotion-related groups. The 53% incidence of emotional problems in the patients with otherwise unexplained gastritis was significantly greater than the incidence of 10% observed in 52 duodenal ulcer patients ($p<0.01$). The incidence was also significantly greater than the 25% incidence among 32 socioeconomically similar medical in-patients ($p<0.05$). The data support the hypothesis that emotional stress plays a role in altering the integrity of the gastric mucosa.

6424 ACUTE PYLORIC OBSTRUCTION BY GALLSTONE: REPORT OF A CASE DIAGNOSED BY GASTROSCOPY. (Eng.) Grove, O. (Hellerupvej 72, DK-2900 Hellerup, Denmark). *Gastrointest. Endosc.* 22(4): 212-213; 1976.

The case of a patient in whom the diagnosis of acute pyloric obstruction by a gallstone was made by gastroscopy is presented. The patient, a 64-yr-old man with a history of duodenal ulcer, presented with an 8-hr history of hematemesis preceded by stabbing pain in the epigastrium. There was occult blood in the stools. Immediate gastroscopy revealed a distended stomach containing several liters of hematin-colored liquid. The pylorus was open, with a diameter of about 1 cm. The stone could be seen through the opening. A preoperative barium meal showed the contours of an oval concrement located behind and below the pylorus. At surgery, a 4.2 x 2.8-cm gallstone located in the duodenal bulb with the pointed end occluding the pylorus was removed. There was a broad fistula from the duodenal bulb to a contracted gallbladder, but no additional stones and no signs of duodenal ulceration were seen. The patient did well postoperatively. This case illustrates that obstructions caused by gallstones or other foreign bodies may be precisely and rapidly diagnosed by endoscopy.

6425 CELLULASE BEZOAR INJECTION: A NEW ENDOSCOPIC TECHNIQUE. (Eng.) Gold, M. H., Jr.; Patteson, T. E., III.; Green, G. I. (Medical Coll. Virginia, Virginia Commonwealth Univ., Richmond, VA 23219). *Gastrointest. Endosc.* 22(4): 200-202; 1976.

Two cases of phytobezoar dissolution are presented that employed direct endoscopic injection of cellulase after failure of previously described nonsurgical techniques. The first patient, a 47-yr-old woman, presented with postprandial epigastric and left upper quadrant pain without vomiting. A 7 x 9-cm bezoar was discovered on the posterior wall of the body and fundus of the stomach by the upper gastrointestinal series and by gastroscopy. In addition, a contraction ring in the antrum was noted. The patient was instructed to ingest meat tenderizer and later, three tablets of cellulase. Each treatment failed to completely dissolve the bezoar, and symptoms persisted. Finally, six cellulase tablets were crushed and suspended in 300 ml of warm water. The suspension was injected directly into the body of the bezoar through a catheter inserted through the biopsy channel of the gastroscope. Upper gastrointestinal radiographs taken 2 weeks later revealed no evidence of the bezoar. The patient's symptoms persisted, due to antral stenosis proximal to the pyloroplasty done 2 yr earlier. The pyloroplasty was reconstructed as a long Heineke-Mikulicz procedure, and the patient has been asymptomatic for 4 months. The second patient, a 69-yr-old woman, presented with a 3-day history of epigastric pain, which was worsened by food and relieved by emesis. The patient had a previous vagotomy, hemigastrectomy, and Billroth I anastomosis. An 8 x 10-cm bezoar, discovered by gastrointestinal radiography and gastroscopy, was fixed to the gastric wall and extended from the proximal body of the stomach to just proximal to the anastomosis. Attempts to mechanically disrupt the mass with both the endoscope and biopsy forceps were only partially successful. Shortly after the procedure, the patient regurgitated several fragments of the bezoar. Further treatment with p.o. cellulase failed to dissolve the gastric remnant. Three days after cellulase was injected directly into the bezoar, the patient became asymptomatic, and upper gastrointestinal radiography 10 days later failed to demonstrate evidence of residual material. The authors believe that the described method of bezoar dissolution should be employed during the initial gastroscopy, and may obviate the need for hospitalization.

6426 BRUNNER GLAND HETEROTOPIA PRESENTING AS GASTRIC ANTRAL POLYPS. (Eng.) Johnson, C. D.; Bynum, T. E. (Methodist Hosp., Houston, TX). *Gastrointest. Endosc.* 22(4):210-211; 1976.

The rare case of a patient with Brunner's gland polyps (heterotopias) that produced symptoms of intermittent gastric outlet obstruction because of their size and location is presented. The patient, a 42-yr-old woman, presented with midepigastric pain of 2 week's duration, nausea, and vomiting. Gastroscopy revealed mild erythema with diffuse nodularity in the antrum. Two polyps were seen, the largest being juxtaposed to the pylorus, with a broad base attached to the lesser curvature. A third polyp was found in the duodenum, 1 cm distal to the apex of the duodenal bulb. These polyps were removed using the snare and electrocautery technique. The patient has experienced no recurrence of symptoms. Histologically, both gastric polyps showed hyperplasia of Brunner's glands beneath a normal gastric antral surface epithelium. This case is unusual because of the histology of the polyps and because these structures produced symptoms.

6427 THE ASSOCIATION OF DUODENOGASTRIC REFLUX WITH DUMPING AND GASTRIC RETENTION. (Eng.) Donovan, I. A.; Keighley, M. R. B.; Griffin, D. W.; Harding, L. K.; Alexander-Williams, J. (Dudley Road Hosp., Birmingham, England). *Br. J. Surg.* 63(5):349-351; 1976.

Because reflux of duodenal contents into the stomach may produce dumping and gastric retention after gastric operations, gastric emptying and duodenogastric reflux were studied in 20 patients before and after proximal gastric vagotomy (PVG, 9 patients) or truncal vagotomy and antrectomy (TV + A, 11 patients) for uncomplicated duodenal ulcer. Duodenogastric reflux was assessed either by a fluoroscopic technique or by determining whether the maximum bilirubin concentration obtained from four 10-min samples of fasting gastric juice was greater or less than 8-5 μM. Biochemical reflux (>8.5 μM bilirubin concentration) was present in eight subjects, seven of whom had radiological confirmation of pyloric regurgitation. Duodenogastric reflux occurred in seven patients with TV + A and in one patient with PGV ($p<0.05$). Delayed solid meal emptying occurred in eight patients with TV + A and in two patients with PGV ($p<0.05$). Cascading of liquids occurred in combination with delay in three patients with TV + A and in one patient with PGV. Cascading occurred in combination with reflux in one patient with TV + A delay and reflux in two patients, and cascading, delay, and reflux in three; none of these combinations were found in any patient who had undergone PGV. A clinical review of the patients was performed 3 months after surgery. Symptoms of dumping, gastric retention, and bile regurgitation or vomiting were then related to the abnormalities of motility. Of the seven patients with only one abnormality of motility, two had associated symptoms. However, 8 of the 10 patients with more than one abnormality had at least one associated set of symptoms. Therefore, there was a significantly greater risk of symptoms if more than one abnormality was present ($p<0.05$). The results confirm the impression that PGV is a desirable operation for peptic ulcer because of its relative freedom from side-effects associated with abnormalities of gastroduodenal motility.

6428 GASTRIC SARCOIDOSIS, PRESENTING AS ANTRAL SCARRING. (Eng.) Blackstone, M. O.; Dhar, G. J.; Mizuno, H.; Para, M. F. (Dept. Medicine, Univ. Chicago, Box 400, 950 East 59th St., Chicago, IL 60637). *Gastrointest. Endosc.* 22(4):211-212; 1976.

The case of a patient with gastric involvement in systemic sarcoidosis is presented. The patient, a 64-yr-old woman with a 5-yr history of sarcoidosis, presented with nonspecific gastrointestinal symptoms accompanied by a 65-pound weight loss. Over the preceding 4 months, she experienced a loss of salivation and tear formation. Upper gastrointestinal radiography showed irregularity and mild rigidity of the distal antrum. Fiberoptic gastroscopy revealed a somewhat thickened appearance of the antral folds, with an area in the prepyloric antrum of fold convergence and centeral depression suggesting an ulcer scar. Biopsy of these folds revealed noncaseating granulomas consistent with gastric sarcoidosis. The endoscopic finding of antral scarring indicated by converging folds should be added to the list of changes expected in gastric sarcoidosis.

6429 ULCER SIMULATING GASTRIC CARCINOMA: I. DIAGNOSTIC CONSIDERATIONS AND TREATMENT. (Eng.) Hakkiluoto, A.; Lempinen, M. (Univ. Central Hosp., 00290 Helsinki 29, Finland). *Ann. Chir. Gynaecol. Fenn.* 64(1):5-9; 1975.

Information concerning the diagnosis, radiological findings, gastroscopic findings, surgical treatment, and long-term mortality among 48 patients with small ulcer-stimulating carcinomas is presented. These 48 patients were among 1,324 patients treated for gastric carcinoma at one hospital between 1953 and 1971, an incidence of 3.9%. The mean age of the patients was 56.8 yr, and the male/female ratio was 31:17. Burning epigastric pain was the most important symptom. Eighteen patients had symptoms for less than 1 yr, 9 patients for 1-3 yr, and 21 patients for more than 3 yr. Thirteen patients were treated for "peptic ulcer" for 1-14 yr. Sixty percent of the patients were in blood group A. The x-ray findings suggested the diagnosis in 52% of 44 patients. Endoscopic examination was performed in 26 patients. In six cases, the lesion was thought to be a benign ulcer. In 13 patients, malignancy was suspected, and in 6 patients, a malignant ulcer was diagnosed by the gastroscopic findings. The ulcers were mostly in the distal part of the stomach, particularly on the lesser curve. In most patients, distal partial gastrectomy without splenectomy was performed. All patients were followed up for over 2 yr, and 38 patients were followed up for over 5 yr. Stomach carcinoma was the cause of death in 19 of 22 patients who died during the follow-up period. The survival time was 3 months to 10 yr. X-ray examination and gastroscopy in 13 patients revealed no recurrent carcinoma. However, gastric cytology revealed malignant cells in one patient who had undergone surgery 6 yr previously.

6430 EROSIVE AFFECTIONS OF GASTRIC MUCOSA. (Eng.) Sokolov, L. K.; Terentiev, N. M.; Voschanova, N. P. (Fourth Principal Admin., USSR Ministry of Public Health, USSR). *Ter. Arkh.* 48(3): 63-66; 1976.

6431 ACUTE LESIONS OF THE GASTRIC MUCOSA. REPORT OF 200 CASES. I. ETIOLOGY AND PATHOANATOMY. (Spa.) De La Revilla, L.; Cano-Bueso, F.; Martinez-Checa, J.; Marti, J.; Montero, E. (Departamento de Medicina Interna, Ciudad Sanitaria "Ruiz de Alda" de la Seguridad Social, Granada, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(2):169-180; 1976.

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6467 MULTICHANNEL RECORDING OF STOMACH ELECTRIC ACTIVITY FROM THE HUMAN BODY SURFACE. (Rus.) Sobakin, M. A.; Privalov, I. A. (Inst. Physiology, Siberian Branch, USSR Acad. Medical Sciences, USSR). *Biull. Eksp. Biol. Med.* 81(4):506-507; 1976.

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6469 USE OF THERAPEUTIC DIETS FOLLOWING RESECTION OF TWO-THIRDS OF THE STOMACH. (Rus.) Fedyshin, P. S.; Dovzhenko, N. A.; Vasilyeva, V. S.; Vershinskaya, N. V. (Kiev Inst. Postgraduate Studies for Physicians, Kiev, USSR). *Vrach. Delo.* (3):73-76; 1976.

6470 THE ROLE OF CALCIUM IN THE MECHANISM OF SECRETION OF HYDROCHLORIC ACID. (Rus.) Ivashkin, V. T.; Dorofeev, T. I. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Klin. Med. (Mosk.)* 54(4):94-100; 1976.

6471 THE EFFECT OF CALCITONIN ON GASTRIC SECRETION. (Cze.) Blahos, J.; Mertl, L.; Gregor, O.; Kotas, J.; Reisenauer, R. (I interni klinika fakulty detskeho lekarstvi, Prague 1, Vlasska 36, Czechoslovakia). *Cesk. Gastroenterol.* 29(6):385-392; 1975.

6472 ELECTROLYTES, PROTEIN AND SIALIC ACID IN THE GASTRIC JUICE DURING TREATMENT WITH MEPHENEMIC ACID. (Pol.) Adamska-Dyniewska, H.; Bala, T.; Goch, J. H.; Jeziorska, J. (II Klinika Chorob Wewnetrznych WAM, 91-347 Lodz, ul. Kniaziewicza 1/5, Poland). *Pol. Tyg. Lek.* 30(26):1101-1102; 1975.

6473 EFFECT OF SELECTIVE PROXIMAL VAGOTOMY ON THE GASTRIC SECRETORY FUNCTION. (Rus.) Postolov, P. M.; Baido, V. P.; Kuzin, N. M.; Kiselev, Yu. I. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (3):59-64; 1976.

6474 THERAPEUTIC RESULTS IN POSTGASTRECTOMY SYNDROME OBTAINED WITH IPRONAL. (Pol.) Gamski, M.; Tyminski, W. (III Klinika Chorob Wewnetrznych AM, 80742 Gdansk, ul. Kieturakisa 1, Poland). *Pol. Tyg. Lek.* 30(24):1023-1024; 1975.

6475 LATE COMPLICATIONS OF GASTRIC SURGERY. (Fre.) Blondel, Ph. (Hopital Cochin, 75014 Paris, France). *Rev. Med.* 16(35):2341-2348; 1975.

6476 X-RAY ASSESSMENT OF THE MOTOR EVACUATORY FUNCTION OF THE STOMACH FOLLOWING ANTRAL MUCOSECTOMY COMBINED WITH BILATERAL TRUNK VAGOTOMY. (Rus.) Danilov, K. Yu.; Shevtsov, Yu. A.; Udovsky, E. E.; Kurtenok, L. G. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Eksp. Khir. Anesteziol.* (2):34-35; 1976.

6477 THE EMPTYING PROCESS OF THE RESIDUAL STOMACH AFTER VARIOUS METHODS OF ANASTOMOSIS. (Ger.) Peters, H.; Winkler, H.; Schubert, H.-J. (Abteilung Chirurgie, Medizinischen Fakultat, Rheinisch-Westfalische Technische Hochschule Aachen, Goethestrasse 27-29, D-5100 Aachen, W. Germany). *Langenbecks Arch. Chir.* 341(1):11-21; 1976.

See also, 6204, 6276, 6280, 6281, 6285, 6330, 6333, 6334, 6337, 6339, 6344, 6346, 6348, 6349, 6350, 6351, 6381, 6409, 6479, 6483, 6485, 6498, 6500, 6513, 6536, 6540, 6545, 6548, 6556, 6666, 6784, 6832, 6838, 6865, 6873.

STOMACH

Peptic Ulcers

6478 HOSPITAL ADMISSIONS FOR PEPTIC ULCER DURING 1958-72. (Eng.) Brown, R. C.; Langman, M. J. S.; Lambert, P. M. (Ipswich Hosp., Ipswich, England). *Br. Med. J.* 1(6000):35-37; 1976.

Unpublished data on hospital discharges and deaths of patients with peptic ulcer in England, Wales, and Scotland between 1958 and 1972 was examined. During this time, admissions to hospitals in England and Wales of patients aged 15 yr or more with gastric and duodenal ulcers declined steadily, from 23,109 and 34,083 patients, resp., in 1958 to 11,918 and 29,988 patients, resp., in 1972. For both gastric ulceration and duodenal ulceration without perforation, the fall in admission rates per 100,000 population was similar for men and women. By contrast, admission rates for perforated ulcer fell more among men than among women, those for perforated gastric ulcer in men falling by over half. Among women, there was a small rise in the admission rate for perforated duodenal ulcer. There was a 14% and 19% decrease in nonperforated duodenal ulcer admissions in men and women, resp., during the periods 1958-1960 and 1970-1972. There were 44% and 34% decreases in nonperforated gastric ulcer in men and women, resp., during the same period and 56% and 14% decreases in perforated gastric ulcer in men and women, resp. There was a 25% decrease in perforated duodenal ulcer in men and a 12% increase in perforated duodenal ulcer in women. Admission rates for duodenal ulcer, both perforated and nonperforated, were consistently higher (approximately 3 times) in the north than in the south, and were highest in Scotland.

6479 GASTRIC EMPTYING IN CONTROL SUBJECTS AND PATIENTS WITH DUODENAL ULCER BEFORE AND AFTER VAGOTOMY. (Eng.) Howlett, P. J.; Sheiner, H. J.; Barber, D. C.; Ward, A. S.; Perez-Avila, C. A.; Duthie, H. L. (Sheffield Royal Infirmary, Sheffield, England). *Gut* 17(7):542-550; 1976.

Gastric emptying of a solid meal was studied in 26 normal subjects and in 27 patients with duodenal ulcers before and after surgery [truncal vagotomy and pyloroplasty (TV) or highly selective vagotomy (HSV)]. The patients were fed a meal of meat, peas, and mashed potatoes with a total weight of 250 g. Indium ^{113m}diethylene triamine pentaacetic acid (DPTA) was incorporated into the potatoes. The activity over the stomach was measured by gamma camera for 60 min from the beginning of the meal. The gastric emptying curve was analyzed by principle component analysis, half emptying time, and early emptying phase. With principal component analysis, the first coefficient showed no difference between the controls and patients before vagotomy. The second coefficient had a bimodal distribution in the ulcer group. The distributions of the two groups showed a significant difference ($p<0.01$). The second emptying coefficient showed a significant ($p<0.05$) correlation with peak gastric acidity in 15 patients who underwent secretory studies. The half-emptying time showed no difference in distribution or mean between the groups. Early emptying ratios showed no evidence of a fast initial phase, and the overall mean was significantly greater than 1.0 ($p<0.02$). After vagotomy, principal component analysis showed a significant delay ($p<0.001$) in emptying 1 week after either type of vagotomy in the first component. At 1 month, TV-patients were significantly slower ($p<0.05$) in gastric emptying than were preoperative or control subjects, while patients after HSV were not. These differences had disappeared by 6 months. The early emptying ratio results were identical to those found for the first component. At 6 months, the preoperative and HSV groups both had an initial phase of gastric emptying slower than the subsequent rate in each group. Six months after TV, the patients did not demonstrate this slower phase, the difference between the two operations being significant ($p<0.05$). A correlation with symptoms was made in a small group of 24 patients. There was a significantly greater incidence of episodic diarrhea after TV (six patients) than after HSV (one patient, $p<0.05$). A combined score for diarrhea and dumping showed a significant difference ($p<0.05$) between the TV and the HSV groups, with the majority of HSV patients being symptom-free. The third coefficient in principal component analysis distinguished 2 patients with moderate diarrhea from 12 who began recording 5 min after eating. In all 24 patients, the records started 25 min after eating showed no separation. Half emptying time showed no correlation with the overall symptom score or with any individual symptoms. Patients after TV had a significant correlation ($r=0.87$) between the initial emptying ratio and the combined score for dumping and diarrhea. HSV patients showed no correlation. It is concluded that principal component analysis is useful, because it does not demand preconceived concepts about the functional form of the data, but the usefulness of half-emptying time is questionable. The results show that by 6 months after surgery, the HSV patients were not significantly different from normal, while some of the TV patients still showed emptying abnormalities.

6480 GASTRIC EMPTYING OF A FLUID TEST MEAL IN HEALTHY VOLUNTEERS AND PATIENTS WITH DUODENAL ULCER BEFORE AND AFTER SELECTIVE PROXIMAL VAGOTOMY. (Eng.) Carlberger, G. (Serafimer Hosp., Stockholm, Sweden). *Scand. J. Gastroenterol.* 10(35): 45-47; 1975.

Gastric emptying of a fluid test meal was measured in seven healthy volunteers and in eight duodenal ulcer patients before and after selective proximal vagotomy. In the normal volunteers, there was a rapid emptying initially, but after 5 min, a slow emptying phase was seen. There was no significant difference in gastric emptying between the controls and the ulcer patients before operation. Among another group of eight duodenal ulcer patients who showed a complete lack of acid response to insulin following selective proximal vagotomy, the emptying curve showed a marked increase in both the initial and the slow phase. The author concludes that the rapid emptying may be caused by a defect in the ability of the stomach to relax, which may be due to the sectioning of the vagal fibers to the gastric corpus and fundus.

6481 EFFECT OF NORMAL AND ULCER-TYPE DIET ON THE ACIDITY OF GASTRIC CONTENTS IN PATIENTS WITH DUODENAL ULCER. (Eng.) de Paula Castro, L.; Filho, J. G.; Pessoa, W. (Hospital das Clinicas, UFMG, Belo Horizonte, Minas Gerais, Brazil). *Digestion* 13(4):241-245; 1975.

The value of using a bland versus a normal diet in the last stage of treatment for peptic ulcer was studied in 15 patients with uncomplicated duodenal ulcer. The bland diet included maizena, corn flour, porridge, milk, butter, grated cheese, rice, spaghetti, eggs, potato puree, and xuxu. The normal diet included milk, coffee, sugar, bread, butter, rice, beans, meat, spaghetti, green salad, cooked vegetable, oranges, banana, tomato, green bean pods, potato puree, rice, and sweetmeat. During the second week of maintenance on either a bland or normal diet, a nasogastric tube was inserted and left in for 3 days. The diets were distributed into five meals a day, and gastric juice was collected every half hour from 7:30 a.m. to 10 p.m. A graph of the mean pH level of the gastric contents of 10 patients given bland and normal diets revealed that there was no statistically significant difference between the two diets. The results demonstrate no therapeutic advantage to using a bland diet in treatment of ulcer patients.

6482 SERUM GASTRIN AND H$^+$ SECRETION AFTER VAGAL STIMULATION IN NORMAL SUBJECTS AND IN PATIENTS WITH DUODENAL ULCER. (Ger.) Kleybrink, H.; Fritsch, W.-P.; Rick, W.; Hausamen, T.-U. (I. Medizinische Universitatsklinik A, 4 Dusseldorf 1, Moorenstr. 5, W. Germany). *Med. Welt* 26(37):1540-1641; 1975.

The role of the vagus system in gastrin and HCl liberation in 5 healthy persons and 21 duodenal ulcer patients was examined using the hypoglycemia test. The success of the test depends on a reduction in blood sugar of at least 40 mg%, which was elicited by 0.2 U/kg of insulin. A significant

($p<0.001$) rise in gastrin from a mean of 58 pg/ml to a maximum of 138 pg/ml was established for healthy persons. For duodenal ulcer patients, the increase was from a mean of 61 pg/ml to 142 pg/ml ($p<0.001$). The areas under the gastrin curves (sum of pg/ml times 15 min) were not different in healthy persons and ulcer patients. HCl production in healthy persons rose from 1.2 mval/hr to 12 mval/hr ($p<0.005$) and in duodenal ulcer from 7.2 mval/hr to 36 mval/hr ($p<0.001$); the increase in the duodenal ulcer group was significantly higher than in healthy persons. The results show that the vagus liberates more HCl in duodenal ulcer patients than in healthy persons, an effect which is not a function of increased gastrin secretion. An increased activity of the vagus on target cells can be inferred. The mechanism is either by direct stimulation of HCl production or by elevating the cells' sensitivity to gastrin.

6483 THE EFFECT OF VAGOTOMY ANTRECTOMY OR VAGOTOMY PYLOROPLASTY ON THE RESPONSE OF THE ANTRUM TO MEAT EXTRACT IN DUODENAL ULCER PATIENTS.

(Eng.) Coutsoftides, T.; Himal, H. S. (Royal Victoria Hosp., 687 Pine Ave. West, Montreal, Quebec, Canada). *Ann. Surg.* 184(2):212-216; 1976.

Studies were carried out in 42 duodenal ulcer patients and 9 controls to determine whether there are two types of duodenal ulcer patients: those with normal acid output and those with elevated acid output. Basal gastric acid secretion was determined in fasted patients, as was bouillon- and betazole-stimulated acid secretion. The mean acid output in response to betazole (1-2 mg/kg, i.m.) in the duodenal ulcer patients (30.58 mEq/hr) was significantly greater than that of the controls (16.76 mEq/hr, $p<0.001$). All duodenal ulcer patients were grouped according to those who did or did not respond to bouillon (3 cubes in 150 cm^3 water, pH 7.0). Fourteen patients in whom food-stimulated basal output was at least twice that of basal acid output were labeled "antral responders," and the remaining patients were labeled "nonresponders." In the responders, the mean levels of bouillon-stimulated acid output (10.89 mEq/hr) and peak serum gastrin (105.04 pg/ml) were significantly increased over basal levels (3.23 mEq/hr and 67.71 pg/ml, resp., $p<0.05$). In four responders who were followed up 3 months following vagotomy and pyloroplasty, the mean bouillon-stimulated acid output level was decreased postoperatively (0.79 mEq/l) from the preoperative level (8.48 mEq/l, $p<0.05$), as was the postoperative betazole-stimulated output (4.06 mEq/l postoperatively, 21.41 mEq/l preoperatively, $p<0.05$). Twelve patients had vagotomy-antrectomy and Billroth II anastomosis. In the eight patients who responded to bouillon, vagotomy-antrectomy significantly decreased bouillon-stimulated output (0.57 mEq/l) and betazole-stimulated output (5.26 mEq/l) from preoperative levels of 8.68 and 26.72 mEq/l, resp. After vagotomy-pyloroplasty, in antral responders, peak and basal serum gastrin levels increased from mean preoperative values of 124.5 and 72.0 pg/ml, resp., to postoperative values of 197.0 and 192.0 pg/ml, resp. There was no difference between pre- and postoperative basal and peak gastrin levels in patients who did not respond to bouillon. Two patients had an incomplete vagotomy, indicated by a positive Hollander test: one after vagotomy-pyloroplasty and one after vagotomy-antrectomy. Antrectomy with an incomplete vagotomy abolished the bouillon-stimulated acid response. The results suggest that the bouillon-stimulation test can select patients with a significant antral component in whom vagotomy and antrectomy would be the appropriate procedure. The results also indicate that antrectomy will protect against recurrent ulceration in patients with incomplete vagotomy, and may explain the lower incidence of stomal ulceration in patients with vagotomy-antrectomy compared to vagotomy-pyloroplasty.

6484 THE BLEEDING MARGINAL ULCER: CATHETERIZATION DIAGNOSIS AND THERAPY.

(Eng.) Rosenbaum, A.; Siegelman, S. S.; Sprayregen, S. (Albert Einstein Coll. Medicine, Bronx, NY). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(4):812-815; 1975.

Five cases in which angiography was successfully employed in visualizing the bleeding site of marginal ulcers in the jejunum are reported. The patients ranged in age from 40 to 92 yr. They had undergone gastrojejunostomy for carcinoma of the head of the pancreas (1 case), partial gastrectomy and gastrojejunostomy for duodenal ulcer disease (3 cases), or subtotal gastrectomy and gastrojejunostomy for carcinoid tumor of the stomach (1 case), each between 7 months and 20 yr before the episode of bleeding. Emergency angiography with a selective superior mesenteric injection revealed the bleeding site in all cases. Pitressin infusion of the superior mesenteric artery was utilized in four cases, with permanent cessation of bleeding in two cases and transient control of bleeding in two cases. The favorable response of bleeding marginal ulcers to pitressin infusion is thought to be related to the tendency of the ulcers to be superficial, and thus, amenable to the induction of coagulation.

6485 GASTROCOLIC FISTULAE IN BENIGN PEPTIC ULCER DISEASE.

(Eng.) Kumar, G. K.; Razzaque, M. A.; Naidu, V. G.; Barbour, E. M. (Wayne State Univ. Sch. Medicine, 540 East Canfield Ave., Detroit, MI 48201). *Ann. Surg.* 184(2):236-240: 1976.

To call attention to the rare occurrence of gastrocolic fistula complicating nonsurgically-treated benign peptic ulcer disease, the cases of four patients with this condition are reported. The patients ranged in age from 12 to 51 yr. The presenting symptoms included abdominal pain in three patients, vomiting in one, fecal vomiting in one, diarrhea in one, bloody diarrhea in one, and weight loss in one. One patient had been taking aspirin every day for over 6 months. Another patient had been treated with ACTH for 4-5 weeks, and a third patient had taken aspirin and prednisolone for 3 yr. In all patients, the penetrating ulcer occurred in the greater curvature of the stomach. In one patient, the fistula occurred between the stomach, jejunum, and transverse colon. The fistula occurred between the stomach and the splenic flexure in one and between the stomach and the transverse colon in two. The fistula was visualized by a barium enema in three patients. In the remaining patient, in whom the fistula occurred between the stomach, jejunum, and transverse colon, the barium enema was normal, and the presence of the fistula was confirmed at laparotomy. The surgical procedure in this patient included subtotal gastrectomy with gastrojejunostomy and segmental resection of the transverse colon and part of the small bowel. In two of the remaining patients, partial or total gastrectomy, together with colectomy were performed. The last patient received a segmental colonic resection with hemigastrectomy and an end-to-end anastomosis of the colon. The authors believe that the incidence of this complication may rise significantly with the more common use of salicylates and corticosteroids.

6486 CONTRIBUTION OF FIBERENDOSCOPY TO THE DIAGNOSIS OF POSTOPERATIVE PEPTIC ULCER. (Ita.) Russo, A.; Moulinier, B. (Hopital Edouard Herriot, Lyon, France). *Minerva Gastroenterol.* 21(4):248-253; 1975.

6487 AN ESTIMATION OF FIBROGASTROSCOPY WITH GASTRIC BIOPSY DATA AND DETERMINATION OF HEXOKINASE ACTIVITY IN SERUM AND GASTRIC JUICE OF PATIENTS WITH GASTRIC ULCER. (Rus.) Pavlov, K. A.; Smirnova, E. V.; Stefanenko, Ju. F. (N. N. Petrov Res. Inst. Oncology, USSR Ministry Health, Leningrad, USSR). *Vopr. Onkol.* 22(5):10-14; 1976.

6488 COMPARATIVE EVALUATION OF RADIOLOGICAL INVESTIGATIONS AND INTRAOPERATIVE FINDINGS IN CHRONIC GASTRIC AND DUODENAL ULCER. (Pol.) Wojszwillo-Geppert, E.; Tobolska, E.; Dybicki, J. (Instytut Chirurgii AM, Gdansk, Poland). *Pol. Przegl. Radiol. Med. Nukl.* 39(5):561-567; 1975

6489 UTILITY AND LIMITATIONS OF FIBROGASTROSCOPY AND CYTOHISTOLOGY IN THE STUDY OF PEPTIC GASTRIC ULCERS. (Ita.) Montori, A.; Messinetti, S.; Viceconte, G.; Battisti, G. (2nd Surgical Symptomatology Sch., Univ. Rome, Rome, Italy). *Minerva Gastroenterol.* 21(3):91-101; 1975.

6490 DIAGNOSTIC VALUE OF GASTROCYTOGRAM IN CHILDREN WITH DUODENAL ULCEROUS DISEASE. (Cze.) Novakova, G.; Noskova, J. (II. detska klinika LFUK, Duklianska 6, 811-25 Bratislava, Czechoslovakia). *Bratisl. Lek. Listy* 64(2):213-218; 1975.

6491 RADIOLOGICAL ASPECTS OF GASTRIC ULCERS IN THE ELDERLY. (Pol.) Kulicz, A.; Nowosielecka-Derus, E. (Katedra Radiologii Sl. AM, Zabrze, Poland). *Pol. Przegl. Radiol. Med. Nukl.* 39(5):569-576; 1975.

6492 THE VALUE OF EGLONYL IN THE TREATMENT OF PEPTIC ULCER. (Pol.) Czarnecka, K. (Klinika Gastroenterologii IChW Sl. AM, 40-752 Katowice, ul. Medykow, Poland). *Pol. Tyg. Lek.* 31(23):995-997; 1976.

6493 A TRIAL OF PREVENTION OF GASTRIC AND DUODENAL ULCER RECURRENCES BY MEANS OF IPRONAL. (Pol.) Gamski, M.; Tyminski, W. (III Klinika Chorob Wewnetrznych AM, 80-742 Gdansk, ul. Kieturakisa 1, Poland). *Pol. Tyg. Lek.* 30(25):1059-1062; 1975.

6494 RESULTS WITH LEVADIAL IN 31 CASES OF ULCER. (Ita.) Campesato, A. (Regional General Hosp., Vicenza, Italy). *Minerva Gastroenterol.* 21(3):155-160; 1975.

6495 RADIOLOGIC ASPECTS AFTER HIGHLY SELECTIVE VAGOTOMY. (Fre.) Eidesheim, D.; Otteni, F.; Hollender, L. F.; Bloch, P. (Service de Chirurgie generale III, C.H.U., 67005 Strasbourg Cedex, France). *J. Radiol. Electrol. Med. Nucl.* 56(12):841-846; 1975.

6496 CONFRONTATION OF RESULTS OF X-RAY EXAMINATION AND FIBROSCOPY IN DIAGNOSIS OF ULCER OF THE DUODENAL BULB. (Fre.) Chaput, J.-C.; Labayle, D.; Etienne, J.-P. (Hopital Antoine Beclere, 157, rue de la Porte de Trivaux, 92140 Clamart, France). *Ann. Gastroenterol. Hepatol.* 11(3):217-224; 1975.

6497 THE RADIOLOGICAL DIAGNOSIS OF ULCER RECURRENCE FOLLOWING DRAINAGE OPERATIONS. (Ger.) Sapounov, S.; Krause, D. (Rontgenabteilung des Marienkrankenhauses, 2 Hamburg 76, Alfredstrasse 9, Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 122(6):547-549; 1975.

6498 ENDOSCOPIC DIAGNOSIS OF ANASTOMOTIC ULCER AFTER GASTRIC SURGERY: STUDY OF 150 CASES. (Fre.) Moulinier, B.; Lambert, R.; Russo, A.; Truchot, R. (Hopital Edouard Herriot, 69374 Lyon Cedex 2, France). *Ann. Gastroenterol. Hepatol.* 11(3):209-216; 1975.

6499 MOTOR FUNCTION OF SMALL BOWEL AND ABSORPTION OF D-XYLOSE FOLLOWING VAGOTOMY. (Rus.) Bokareva, G. S.; Nishchy, V. A. (Novokuznetsk Inst. Postgraduate Studies for Physicians, Novokuznetsk, USSR). *Khirurgiia (Mosk.)* (3):65-67; 1976.

6500 MORPHOLOGY AND FUNCTION OF GASTRIC MUCOSA FOLLOWING VAGOTOMY AND DRAINAGE PROCEDURES IN PATIENTS WITH DUODENAL ULCERS. (Rus.) Nezhdanova, G. A.; Aruin, L. I.; Grinberg, A. A. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (3):67-72; 1976.

6501 ABSORPTION OF LIPIDS FROM THE DIGESTIVE TRACT AFTER SURGICAL TREATMENT OF DUODENAL ULCER. (Pol.) Tolloczko, A.; Dzienis, H.; Puchalski, Z.; Barczyk, J. (Instytut Chirurgii AM, 15-276 Bialystok, ul. Sklodowskiej 24a IV p, Poland). *Pol. Przegl. Chir.* 47(12):1547-1551; 1975.

6502 ADRENERGIC PROCESSES AND PARTIAL GASTRIC SECRETION. (Ger.) Anschelewitsch, J.; Okun, K. (Medizinisches Institut, Riga, Bulwar Padomju 12, USSR). *Z. Gesamte Inn. Med.* 31(9):277-280; 1976.

6503 HYDROGEN IONS BUFFERING CAUSED BY GASTRIC JUICE PROTEINS IN PATIENTS WITH PEPTIC ULCER. (Pol.) Szafran, H.; Popielka, T.; Bucki, J. (Samodzielny Oddzial Gastroenterologiczny AM, Krakow, ul. Pradnicka 35/37, Poland). *Przegl. Lek.* 33(3):372-381; 1976.

6504 THE SIGNIFICANCE OF HARMFUL ENVIRONMENTAL FACTORS IN THE DEVELOPMENT OF PERSONALITY, THE ROLE OF PSYCHIC STRESS AND DEFINITE PERSONALITY TRAITS IN THE PATHOGENESIS OF DUODENAL AND GASTRIC ULCER. (Pol.) Czubalski, K.; Galczak, A. (Poradna Chorob Psychosomatycznych Centralnego Szpitala Klinicznego AM, Warsaw, Poland). *Pol. Tyg. Lek.* 31(19):801-804; 1976.

6505 GASTRODUODENAL ULCER--DISEASE OR COMPLICATION? THE PREULCEROUS STAGE. (Spa.) Nasio, J. (Real Academia de Medicina y Cirugia de Galicia, La Coruna, Spain). *Galicia Clin.* 47(7):542-553; 1975.

6506 GASTRIC ULCER AS THE SO-CALLED SECOND ULCER. (Pol.) Marlicz, K.; Szymanski, Z. (Klinika Chorob Wewnetrznych Instytutu Chorob Wewnetrznycir PAM, ul. Unii Lubelskiej 1. 71-344 Szczecin, Poland). *Wiad. Lek.* 28(16):1357-1360; 1975.

6507 DYNAMICS OF THE MINERAL CONTENT OF THE BLOOD AND GASTRIC JUICE IN PATIENTS WITH GASTRIC AND DUODENAL ULCER. (Rus.) Revutsky, B. I.; Yeremeyev, E. S. (Donetsk Medical Inst., Donetsk, USSR). *Vrach. Delo* (4):97-99; 1976.

6508 SEROTONIN METABOLISM IN PEPTIC ULCER. (Rus.) Gubsky, V. I.; Dalavurak, V. P.; Eloyev, V. A.; Kukharenko, E. I. (Kharkov Scientific Res. Inst. General and Emergency Surgery, Kharkov, USSR). *Vrach. Delo* (3):78-81; 1976.

6509 PRODUCTION OF OFFSPRING BY PATIENTS SUFFERING FROM DUODENAL ULCER. (Cze.) Kobickova, Z.; Vesely, K. T. (128 20 Praha 2, U nemocnice 1, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(5):302-306; 1975.

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6512 ASSOCIATION OF GASTRODUODENAL ULCER WITH CALCULOUS CHOLECYSTOPATHY. (Ita.) Nicoletta, G. (Ospedale Provinciale "S. Carlo," Potenza, Italy). *Minerva Med.* 66(62):3138-3144; 1975.

6513 MICROFLORA OF THE JEJUNAL CONTENTS IN PATIENTS WITH THE DUMPING SYNDROME DEVELOPING DUE TO GASTRIC RESECTION FOR PEPTIC ULCER. (Rus.) Kudinova, T. I.; Loranskaya, T. I. (Inst. Nutrition, USSR Acad. Medical Sciences, Moscow, USSR). *Vrach. Delo* (4):99-102; 1976.

6514 GASTRODUODENAL HEMORRHAGES IN PATIENTS WITH OPISTHORCHOSIS. (Rus.) Kirilenko, M. P. (Tyumen Oblast Clinical Hosp., Tyumen, USSR). *Khirurgiia (Mosk.)* (3):51-53; 1976.

6515 CHRONIC OBSTRUCTIVE LUNG DISEASE AND PEPTIC ULCERATION. (Cze.) Pruszynska, S.; Krawczyk, Z.; Zrobkowa, K.; Zythiewicz, Z. (ul. Okolna 179/181. 91-520 Lodz, Poland). *Gruzlica* 43(8):713-718; 1975.

6516 REFLUX ESOPHAGITIS IN ULCER DISEASE. (Rus.) Serebrina, L. A.; Mavrodiy, V. M. (Odessa Scientific Res. Inst. Balneology, Odessa, USSR). *Vrach. Delo* (4):102-105; 1976.

See also, 6196, 6372, 6523, 6638, 6639.

6517 FIBEROPTIC ENDOSCOPY DURING LAPAROTOMY IN THE DIAGNOSIS OF SMALL INTESTINAL BLEEDING. (Eng.) Greenberg, G. R.; Phillips, M. J.; Tovee, E. B.; Jeejeeboy, K. N. (Dept. Medicine, Surgery, and Pathology, Univ. Toronto, Toronto, Ontario M5S 1A8, Canada). *Gastroenterology* 71(1):133-135; 1976.

The case of a 22-yr-old woman in whom the diagnosis of hereditary hemorrhagic telangiectasia was made by combining fiberoptic endoscopy and laparotomy is presented. The patient had a 4-yr history of recurrent melena and hematemesis, but barium studies, intestinal angiography, gastroduodenoscopy, sigmoidoscopy, and colonoscopy to the ileocecal valve were repeatedly normal. A laparotomy performed 3 months before hospitalization had not revealed the source of the blood loss. At the second laparotomy, the peritoneal cavity was entered through a right paramedian incision; several adhesions were taken down, and the duodenal-jejunal flexure was identified. The fiberoptic colonoscope was introduced p.o. and passed to the first part of the duodenum, where it could be pulled into the proximal jejunum. By extending the small bowel over the distal 40 cm of the colonoscope in concertina-like fashion, the entire small intestine was visualized. Approximately 18-20 red raised lesions, consistent with telangiectasia, were observed in the proximal 55 cm of jejunum. The involved segment was resected. The same procedure was performed 1 month later, when bleeding recurred; 60 cm of jejunum containing new lesions was resected. The procedure was performed a third time, when new lesions in the remaining jejunum and the third part of the duodenum were found. A Whipple's procedure with duodenoileal anastomosis was performed, and the patient has remained asymptomatic for 6 months. Although the endoscopy-laparotomy combined procedure should be reserved for the most difficult diagnostic problems, the use of this technique may permit complete visualization of the entire gastrointestinal tract, and enhance the clinician's ability to identify small intestinal bleeding sources that previously have gone unrecognized.

6518 SUCCESSFUL REPAIR OF A PRIMARY AORTODUODENAL FISTULA. (Eng.) Brenowitz, J. B.; Williams, C. D. (4300 Brand, NE, Albuquerque, NM 87109). *Am. Surg.* 42(4):265-267; 1976.

The case of a 79-yr-old man who underwent successful repair of a primary aortoduodenal fistula is presented. The patient presented with a 1-day history of weakness and melena. There was no abdominal mass, and the patient denied back pain. He passed large amounts of blood per rectum on two occasions, and both times, his blood pressure was restored with whole blood transfusions. The nasogastric aspirate was positive for whole blood. Laparotomy revealed an 8-cm aneurysm of the infrarenal aorta, adherent to the posterior wall of the third part of the duodenum, and an aortoduodenal fistula with a 1.5-cm opening into the duodenum. The duodenal wall was repaired in two layers using No. 000 polypropylene suture. The aneurysm was then resected, and the aorta was replaced with a 19 x 9.5-mm woven dacron bifurcation graft using systemic heparinization. The suture lines were separated with aneurysm wall, peritoneum, and greater omentum to prevent secondary fistulization. Postoperatively, the patient was treated for mild congestive heart failure. He was discharged on the 16th hospital day and has continued to do well for 6 months.

6519 EFFECT OF SMALL BOWEL BYPASS ON SERUM GASTRIN LEVELS AND GASTRIC ACID SECRETION IN MAN. (Eng.) Solhaug, J. H.; Schrumpf, E. (Haukeland Hosp., 5000 Bergen, Norway). *Scand. J. Gastroenterol.* 11(3):329-332; 1976.

The question of whether hypersecretion of serum gastrin or gastric acid occurs in man after intestinal resection was investigated in six patients in whom 20 cm of proximal jejunum was anastomosed to the distal 25 cm of ileum in a jejunoileal bypass operation. The mean basal gastric volume and acid secretion rate at 6 months and 1 yr (46 ml/30 min and 2.57 mEq/30 min, resp., at 6 months; 38 ml/30 min and 1.96 mEq/30 min, resp., at 1 yr) were significantly higher than preoperative values (22 ml/30 min and 0.68 mEq/30 min, resp.). No significant differences were found in pentagastrin (6 μg, s.c.)-stimulated volume or acid secretion. The fasting concentration of serum gastrin at 6 months (mean, 37 pg/ml; $p<0.02$) and 1 yr (mean, 47 pg/ml; $p<0.02$) after operation was significantly increased in comparison with preoperative levels (mean, 25 pg/ml). Whether the increase in basal secretion and serum gastrin concentration is interrelated or of any clinical importance is uncertain.

6520 GASTRIC EMPTYING AND BILE ACID CONCENTRATION IN THE DUODENUM AFTER BYPASS OPERATION OF THE SMALL INTESTINE BECAUSE OF OBESITY. (Eng.) Moberg, S.; Carlberger, G. (St. Goran's Hosp., Box 12500, S-112 81 Stockholm, Sweden). *Scand. J. Gastroenterol.* 11(2):151-154; 1976.

Gastric emptying was measured concomitantly with bile acid concentration in the duodenum of nine patients who had undergone jejunoileal bypass. The results of the gastric emptying experiments were compared with those from seven healthy volunteers. In the seven bypassed patients who had not also undergone cholecystectomy, there was a sharp rise in bile acid concentration to a peak value between 5 and 17 min. Thereafter, the values dropped and leveled off at 4-13 mM. In the two cholecystectomized patients, no peak in bile acid concentration occurred during the first 20 min; the values were between 3 and 11 mM. The gastric emptying rate was within normal limits, except in one cholecystectomized, shunt-operated patient who had an extremely low bile acid concentration; there was a constant fall from approximately 5 mM at 3 min to approximately 1 mM at 30 min. It is concluded that the upper part of the small intestine functions well in shunt-operated patients if the gallbladder and at least 10 cm of the distal ileum are left intact.

6521 THE PATHOGENESIS OF DIARRHEA AFTER BYPASS OF THE SMALL INTESTINE. (Eng.) Wise, L.; Stein, T. (New Hyde Park, NY). *Surg. Gynecol. Obstet.* 142(5):686-688; 1976.

The relative importance of bile and fatty acids in the etiology of diarrhea following small intestinal bypass was evaluated in 29 patients. Seven patients were studied before the operation, 8 were studied in the early postoperative period (<2 weeks after operation), and 14 composed the late postoperative group (6-24 months after the operation). The mean fecal weight in the preoperative group was 421 g/48 hr, which increased significantly during the early postoperative period (2,006 g/48 hr) and the late postoperative period (1,155 g/48 hr). The fecal bile salt output in the late postoperative group (1.6 g/48 hr) was increased significantly over that in the preoperative group (0.6 g/48 hr). The free fatty acid output in the postoperative group (12.5 g/48 hr) was also increased over that in the preoperative group (2.2 g/48 hr). There was a significant Spearman correlation ($p<0.05$) between bile salt output and stool weight in both the early and late postoperative groups. There was no significant correlation between fecal weight and fecal fatty acid output. This suggests that after small intestinal bypass bile salts play a more significant role in the pathogenesis of diarrhea than do free fatty acids.

6522 INTUSSUSCEPTION FOLLOWING JEJUNOILEAL BYPASS: CASE REPORT AND REVIEW OF THE LITERATURE. (Eng.) Wise, L.; Boucher, J. K.; Feutz, E. (Long Island Jewish-Hillside Medical Center, New Hyde Park, NY 11040). *Am. Surg.* 42(5): 346-349; 1976.

The case of a 40-yr-old man who developed intussusception 11 months following a jejunoileal bypass operation is presented. The patient experienced colicky pain 10 months after the operation, but was otherwise asymptomatic. Despite the disappearance of the pain, the patient's hemoglobin decreased, which was accompanied by persistent guaiac-positive stools. Subsequently, he developed tarry stools, a further drop in hematocrit, and massive gastrointestinal hemorrhage, expelling fresh blood per rectum. During the active blood loss, an emergency selective superior mesenteric arteriogram revealed marked extravasation of contrast from a branch of the superior mesenteric artery supplying the jejunum. The venous phase further helped to localize the bleeding site to the jejunum by showing puddling of contrast material between the valvulae conniventes of a dilated segment of small intestine. Inspection of the excluded intestinal segment at laparotomy revealed that the most proximal segment of jejunum had intussuscepted. The intussusception was irreducible, so it was resected. The remaining stump was oversewn and then sutured to its mesentery. The patient made an uneventful recovery. The authors found only 12 previous reports of intussusception among 722 well-documented cases.

6523 DUODENAL CONTRACTION WAVE PATTERNS IN PATIENTS WITH AND WITHOUT ULCER. (Eng.) Monto, G. L.; Ashworth, W. D.; Malecki, M.; Thompson, A. B.; Englert, E. (Veterans Admin. Hosp., 2200 Gage Blvd., Topeka, KS 66622). *Am. J. Gastroenterol.* 65(1):52-56; 1976.

Attempts were made to compare the relative frequencies of isolated, simultaneous, peristaltic, and mixing waves in 10 patients with duodenal ulcers and in 14 control patients without ulcer. A water-perfused tube system was used. The frequency of waves in the proximal duodenum was decreased, and the frequency of waves in the distal duodenum was increased in ulcer subjects as compared to controls. This involved a statistically significant decrease in numbers of mixing (or basic rhythm) waves in the proximal duodenum. Increased numbers of isolated waves were found in ulcer patients in the distal duodenum. The predominant types of contraction waves in both ulcer and control subjects were isolated, and simultaneous waves, with peristaltic waves, were less common in the fasting state. These findings suggest that differences exist in the types of contraction waves in duodenal ulcer subjects compared to controls.

6524 QUANTITATION OF INTESTINAL-TISSUE LAYERS FROM THEIR HISTOLOGY. (Eng.) Younoszai, M. K.; Ranshaw, J. C. (Univ. Hosp. Clinics, Univ. Iowa, Iowa City, IA 52242). *Am. J. Dig. Dis.* 20(8): 764-770; 1975.

A line-sampling technique was used to quantitate the relative proportions of tissue components in p.o.-obtained small intestinal mucosal biopsies. The validity of the technique was tested in six male and six female Holzman rats, in which there is a sex difference between the intestinal size. In 10 specimens from healthy human subjects, the villus epithelium formed 41-46%, the crypt epithelium 20-26%, and the lamina propria 34% of the mucosa. In 10 specimens from patients with gluten enteropathy, the villus epithelium formed 7%, crypt epithelium 43%, and lamina propria 50% of the mucosa. In nine individuals with chronic diarrhea with malabsorption, the percentages of the tissue components were intermediate between those of healthy individuals and those with gluten enteropathy (27%, 30%, and 43% villus epithelium, crypt epithelium, and lamina propria, resp.). In adjacent segments of intestine from rats, the actual weight of the scraped mucosa and that of the underlying tissues correlated very well with their corresponding weights estimated from the microscopic histology, using the line-sampling technique. The intestinal tissue layers quantitated were the villus epithelium, crypt epithelium, the lamina propria plus muscularis mucosae plus submucosa, and the muscle plus the serosal coats. This study shows that the line-sampling technique can be used to estimate volume of the epithelial and nonepithelial tissues in the intestinal wall.

6525 ORAL TREATMENT OF ACRODERMATITIS ENTEROPATHICA WITH ZINC SULFATE.

(Eng.) Der Kaloustian, V. M.; Musallam, S. S.; Sanjad, S. A.; Murib, A.; Hammad, W. D.; Idriss, Z. H. (Dept. Pediatrics, American Univ., Beirut, Lebanon). *Am. J. Dis. Child.* 130(4):421-423; 1976.

The case of a 7-yr-old boy who was successfully treated with p.o. zinc sulfate for acrodermatitis enteropathica is presented. The child had been breast fed until the age of 7 months, when cow's milk was substituted. At that time, alopecia, diarrhea, and skin lesions developed. The diagnosis was made at the age of 1 yr, and treatment with diiodohydroxyquin (325 mg/day, p.o.) was begun. He was successfully treated with this drug until the age of 4 yr, when iodochlorhydroxyquin (500 mg/day, p.o.) was substituted. This treatment was discontinued when the patient was 7 yr old, because of decreased vision. At this time, he was apathetic and weak, and lesions and diarrhea recurred. His hair was sparse and of a woolly consistency. Within 48 hr of the start of zinc sulfate treatment (50 mg 3 times daily, p.o.), there was a definite improvement in the skin lesions, and the diarrhea stopped. At 61 days after the onset of zinc sulfate therapy, the serum zinc level was 160 µg/100 ml; the patient's lesions had healed completely, and healthy hair had started to grow. Zinc sulfate is an innocuous, inexpensive, and effective medication for acrodermatitis enteropathica and can replace the toxic diiodohydroxyquin-like drugs.

6526 FUNCTIONAL AND HISTOLOGICAL STUDY OF THE SMALL INTESTINE IN CHRONIC ALCOHOLISM.

(Fre.) Dedieu, P.; Mussini, J.; McOudea; Miniconi, P. (Clinique Medicale Propedeutique et des Maladies de l'Appareil Digestif, C.H.U. de Nantes, F 44035 Nantes Cedex, France). *Arch. Fr. Mal. App. Dig.* 64(8):639-651; 1975.

Absorption disorders and small intestinal mucosal alterations were studied in 20 chronically alcoholic, but not cirrhotic, patients. Four patients had no evidence of malabsorption. Results of test doses administered to patients indicated malabsorption in 55% after 50 g lactose, 10% after 50 g glucose, 45% after 25 g xylose, 20% after 80 g/day lipids, and 20% after vitamin B_{12} (Schilling test). Lesions of the intestinal mucosa were few and discrete, and thus cannot explain the malabsorption phenomena observed. Ultrastructural alterations of enterocytes were nonspecific and did not affect the microvilli. Intestinal motility studied by barium transit was normal. Intraluminal factors could be implicated in a few patients, suggesting that the malabsorption is an essentially functional alteration and not a morphological anomaly of the enterocytes. The possible role of the folic acid deficit, often associated with chronic alcoholism, in the absorption disorders is discussed.

6527 INTRAMURAL HEMATOMA OF THE DUODENUM.

(Eng.) Prathikanti, V.; Bhuta, I. (Goodrich Medical Center, PC. 7320 S. State Rd., Goodrich, MI 48438). *South. Med. J.* 69(4):490-492; 1976.

The case of a 44-yr-old man with an intramural hematoma of the duodenum is presented, together with a literature review. The patient was hospitalized with a 2-week history of upper abdominal, crampy pain and anorexia associated with vomitus without bile. He had had obstipation for 4 or 5 days. Physical examination revealed a dry tongue and an epigastric mass 3 inches in diameter, situated midway between the xiphisternum and the umbilicus. A routine film of the abdomen revealed a fluid-filled stomach, capped by an air fluid level. A barium enema examination revealed downward displacement of the hepatic flexure and of the proximal portion of the transverse colon. The upper gastrointestinal series revealed pyloric obstruction, which was confirmed at gastroscopy. An exploratory laparotomy revealed a hematoma measuring 3 x 3 x 3 inches, situated over the anterior wall of the duodenum, and extending from the pylorus to the commencement of the second portion of the duodenum. The hepatoduodenal ligament was thick, edematous, and hemorrhagic, and the head of the pancreas was slightly edematous. A longitudinal incision was made over the duodenal serosa, and the hematoma was evacuated. The proximal jejunum was brought in in an anticolic fashion, and a full-thickness jejunal-serosal patch was applied, using 000 interrupted silk sutures. Gastrostomy was performed for decompression of the stomach. The patient made an uneventful recovery. An intramural hematoma usually occurs after blunt trauma, although this was not reported by the patient.

6528 CHANGING CONCEPTS OF DUODENITIS.

(Eng.) Gelzayd, E. A.; Biederman, M. A.; Gelfand, D. W. (23077 Greenfield Rd., Suite 250, Southfield, MI 48075). *Am. J. Gastroenterol.* 64(3):213-216; 1975.

The results of ongoing studies of the clinical, radiographic, endoscopic, and pathologic changes in nonspecific duodenitis are reported. A total of 42 fiberduodenoscopic examinations were performed on 40 patients with this syndrome. Dyspeptic epigastric distress was the most common symptom, and occurred in 30 patients. Melena and/or hematemesis occurred in 14 patients and was usually associated with the erosive form of duodenitis. Peptic ulcer-like symptoms occurred in only 8 of the 38 patients who experienced epigastric distress. Radiographically, 11 patients had a normal duodenal bulb. Duodenal bulb spasm, seen in 18 patients, was the most common abnormality. Six patients had thick or nodular folds. The endoscopic findings fell into two categories: mucosal nodularity and erythema (28 patients) and erosions and friability (14 patients). Pathologically, increased inflammatory cell infiltration of the lamina propria and sometimes of the Brunner's gland area was observed in all patients. The infiltrate was composed of polymorphonuclear neutrophils, eosinophils, and mononuclear cells. Twenty-four patients had superficial mucosal erosions of the surface epithelial layer, and 12 patients showed villous changes with crypt dilatation. Of 26 patients who underwent repeat duodenoscopy and biopsy over a 3-yr follow-up period, there was a decrease in nodularity and erythema in 13 of 18 and a decrease in erosions and friability in 2 of 8 patients. A vigorous ulcer regimen was used for the erosive form of duodenitis, whereas anticholinergic-sedative drugs were used in the patients with the nodular-erythematous form of disease. Nodularity and erythema was increased in one patient, and no change was observed in four. Erosions and friability did not change in two patients and completely disappeared in four. Most patients responded initially to anticholinergic, tranquilizer, or antacid therapy. However, clinical correlations with long-term treatment will require controlled studies.

6529 ANGIOGRAPHY IN ACUTE ISCHEMIA OF THE SMALL INTESTINE. (Ger.) Voegeli, E.; Binswanger, R. (Institut fur Diagnostische Radiologie, Inselspital, CH-3010 Bern, Switzerland). *Schweiz. Med. Wochenschr.* 105(39):1258-1263; 1975.

The value of visceral angiography (VA) complementary to clinical and radiological diagnosis of acute small bowel ischemia was studied retrospectively in 17 patients. Selective presentation of the superior mesenteric artery (SMA) was performed in 14 cases, and abdominal aortography in 3, all of which preceded conventional radiology. All results were confirmed preoperatively or at autopsy. Two patients had well-defined ileus, and 15 had primary disturbances in vascularization. SMA occlusion was found in nine, but not in three cases with peripheral segmental ischemia, including one with aortic aneurysm. Three patients showed VA signs of functional angiospastic mesenteric deficit, with delayed contrast media transit through the mesenteric arteries; all three succumbed in 24-48 hr to extensive infarction of the small bowel and colon. No evidence of vessel occlusion was found at autopsy. In both ileus cases, the VA finding was characterized by partly stenosed and occluded mesenteric arterial branches. VA conveys the exact topographical localization of vascular occlusion and defines the extent of functional angiospastic mesenteric insufficiency. Visceral angiography can play a decisive role in the selection of therapeutic options.

6530 MIDGUT MALROTATION PRESENTING IN ADULT LIFE. (Eng.) Freund, H.; Schiller, M.; Eyal, Z. (Hadassah Univ. Hosp., Jerusalem, Israel). *Chir. Gastroenterol.* 9(3):399-402; 1975.

Two unusual cases of midgut malrotation discovered in adults are presented. The first patient, a 13-yr-old boy, presented with a 3-month history of severe crampy abdominal pain and vomiting. The midgut malrotation was observed in the upper gastrointestinal series and barium enema examination. At laparotomy, the whole bowel from duodenum to the descending colon was found to be suspended from a single narrow dorsal mesentery based on the origin of the superior mesenteric vessels. The ileum entered the cecum from the right. The second patient, a 25-yr-old man, presented with an 8-month history of crampy abdominal pain and vomiting. The upper gastrointestinal series revealed a deformed duodenal bulb, and barium enema showed the large bowel to be in the left abdomen. A misdiagnosis of duodenal ulcer causing pyloric stenosis was made, but at laparotomy the malrotation was found. The duodenum was unrotated and twisted back on itself, and the small bowel had a long mesentery. The ileum entered the cecum from the right. In both patients, fibrous bands were found crossing the abdominal cavity. In both cases, the bands were divided, the intestine was sutured to the posterior abdominal wall, and appendectomy was performed.

6531 A NEW COMPLEX METHOD OF DIAGNOSIS OF INTESTINAL DISEASES. (Rus.) Masevich, T. G.; Kudryashova, G. P.; Ugolev, A. M. (Leningrad Inst. Hygiene and Medicine, Leningrad, USSR). *Ter. Arkh.* 48(3):96-103; 1976.

6532 JEJUNAL ALIMENTATION WITH ELEMENTAL DIET. HUMAN JEJUNAL ABSORPTION OF ISO AND HYPERTONIC SOLUTES IN 35- AND 70-CM TEST SEGMENTS [Abstract]. (Eng.) Hecketsweiler, P.; Vidon, N.; Cortot, A.; Bernier, J. J. (Hopital Saint Lazare, Paris, France). *Digestion* 13(3):172-174; 1975.

6533 ILEOCECAL JUNCTION IN MAN. MORPHOPHYSIOLOGICAL AND CLINICAL CONSIDERATIONS. (Por.) de Carvalho, C. A. F.; Faintuch, J. J. (Instituto de Ciencias Biomedicas, Universidade de Sao Paulo, Sao Paulo, Brazil). *Arq. Gastroenterol. Sao Paulo* 12(3):183-193; 1975.

6534 VALIDATION OF ^{13}C-LABELED VS ^{14}C-GLYCOCHOLATE (GC) IN THE DIAGNOSIS OF BACTERIAL OVERGROWTH BY RESPIRATORY CO_2 ISOTOPIC MEASUREMENTS [Abstract]. (Eng.) Solomons, N.; Schoeller, D.; Wagonfeld, J.; Ott, D.; Rosenberg, I.; Klein, P. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Clin. Res.* 23(4):520A; 1975.

6535 STRUCTURAL COMPLEXITY OF THE MINOR DUODENAL PAPILLA AND ITS FUNCTIONAL POSSIBILITIES. (Spa.) Jimenez, M. F. (Universidad Complutense de Madrid, Facultad de Medicina, I Catedra de Anamtomia, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(4):425-442; 1976.

6536 JEJUNAL POUCH FOR RECONSTRUCTION OF THE STOMACH AFTER TOTAL GASTRECTOMY. (Por.) Paulino, F. (Av. Epitasio Pessoa, 2120-11.°, Rio de Janeiro, Brazil). *Rev. Bras. Med.* 32(7):463-464; 1975.

6537 THE STATE OF THE RENAL FUNCTION AFTER EXTENSIVE ENTERECTOMY. (Rus.) Velichenko, V. M.; Lud, N. G. (Vitebsk Medical Inst., Vitebsk, USSR). *Vestn. Khir.* 115(11):35-39; 1975.

6538 SMALL BOWEL APLASIA COMBINED WITH DUODENAL ATRESIA AND MALROTATION OF THE COLON (SHORT BOWEL SYNDROME). (Ger.) Kemperdick, H.; Lemburg, P.; Muller, E.; Muntefering, H. (Univ. Kinderklinik, Rontgenabteilung, D-4000 Dusseldorf 1, Moorenstrasse 5, Germany). *Z. Kinderchir.* 17(3):217-222, 1975.

6539 HEPATIC METASTASES OF A CARCINOID TUMOR OF THE ILEUM. REPORT OF ONE CASE OF UNUSUAL, PSEUDOCYSTIC ANGIOGRAPHIC ASPECT. (Fre.) Capron, J.-P.; Gineston, J.-L.; Remond, A.; Gontier, M.-F.; Pietri, J.; Lorriaux, A. (Centre Hospitalier Universitaire, place Victor Pauchet, 80000 Amiens, France). *Sem. Hop. Paris* 51(45):2732-2734; 1975.

6540 CARCINOID TUMOR OF THE ILEUM, ULCERATED CANCER OF THE STOMACH AND HEPATIC METASTASES. (Fre.) Chatelin, C.-L.; Rouison, D.; Lasserre, M. (Centre Hospitalier Princesse Grace, Monaco). *Sem. Hop. Paris* 51(45):2723-2726; 1975.

6541 THE CLINICAL SIGNIFICANCE OF JUXTAPAPILLARY DUODENAL DIVERTICULA [Abstract]. (Eng.) Lotveit, T.; Aune, S.; Johnsrud, N. K.; Osnes, M. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 10(34):22; 1975.

6542 ENDOSCOPIC AND DUCTOGRAPHIC FINDINGS IN PATIENTS WITH JUXTAPAPILLARY DIVERTICULA [Abstract]. (Eng.) Osnes, M.; Myren, J.; Swensen, T. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 10(34):22-23; 1975.

6543 POSTOPERATIVE ACUTE NECROTIZING ENTERITIS. REPORT OF ONE CASE AFTER TOTAL HYSTERECTOMY WITH BILATERAL REMOVAL OF THE ADNEXA UTERI. (Fre.) Cortesi, N.; Zanni, C.; Gotuzzo, L.; Barberini, G.; Marchetti, A.; Piccagli, I. (via del Pozzo 71, 41100 Modena, Italy). *J. Chir. (Paris)* 110(1/2):71-76; 1975.

6544 CLINICAL AND ETIOLOGICAL CHARACTERISTICS OF CHRONIC ENTEROCOLITIS IN CHILDREN. (Rus.) Shamsiev, S. Sh.; Bodnya, I. A. (Uzbek Scientific Res. Inst. Pediatrics, Tashkent, USSR). *Pediatriia* (3):34-38; 1976.

6545 GASTROJEJUNOCOLIC FISTULA: EXPERIMENTAL FINDINGS. (Ita.) Perbellini, A.; Montolli, R.; Agugiaro, S.; Cappelletto, T.; Fabris, G. (Istituto di Patologia Speciale Chirurgica e Propedeutica Clinica, Universita degli Studi di Padova, Padova, Italy). *Acta Chir. Ital.* 32(1):113-119; 1976.

6546 JEJUNAL HEMANGIOMA. REPORT OF ONE CASE. (Spa.) Vidal, E. B.; Diez, M. M.; Goicoechea, A. A.; Elizalde, J. M. A. (Catedra de Patologia y Clinica Quirurgica "B," Facultad de Medicina, Universidad de Zaragoza, Zaragoza, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(3):373-386; 1976.

6547 HEMORRHAGES OF THE SMALL INTESTINE. PATHOANATOMICAL CAUSES. (Ger.) Lindner, J.; Schutte, B. (No affiliation given). *Thromb. Diath. Haemorrh.* (Suppl. 61):221-251; 1975.

6548 UP-TO-DATE POSSIBILITIES OF DIAGNOSIS AND THERAPY OF ACUTE HEMORRHAGES FROM THE UPPER ALIMENTARY TRACT. (Rus.) Panchenkov, R. T.; Semenov, V. V.; Popov, Yu. P.; Shenker, M. B. (Moscow Medical Inst. Stomatology, Moscow, USSR). *Khirurgiia (Mosk.)* (5):85-89; 1976.

6549 PROGNOSIS OF MECONIUM ILEUS. (Ger.) Schennach, W.; Menardi, G.; Stauffer, U. G. (Chirurgische Univ.-Klinik, Anichstrasse 35, A-6020 Innsbruck, Austria). *Z. Kinderchir.* 18(2):161-170; 1976.

6550 INCARCERATION OF STONES IN THE AMPULLA OF VATER. (Rus.) Kozlov, I. Z.; Pochechuev, E. A.; Grach, Z. Y. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Khirurgiia* (10):25-29; 1975.

6551 X-RAY DIAGNOSIS OF CHRONIC AND RELAPSING OBSTRUCTION OF THE DUODENUM IN CHILDREN. (Rus.) Petkevich, G. V. (Leningrad Medical Inst. Pediatrics, Leningrad, USSR). *Vopr. Okhr. Materin. Det.* 21(5):67-70; 1976.

6552 ISCHEMIC STENOSIS OF THE SMALL INTESTINE. (Fre.) Saegesser, F.; Borgeaud, J.; Schnyder, P.; Tabrizian, M.; Richon, C. A. (Centre Hospitalier Universitaire vaudois, CH-1011 Lausanne, Switzerland). *Helv. Chir. Acta* 43(1/2):115-118; 1976.

6553 EXPERIENCE WITH JENUNO-ILEAL SHUNT OPERATION IN SEVERE OBESITY. (Ita.) Battezzati, M.; Bachi, V.; Scopinaro, N. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica B, Universita degli Studi di Genova, Genova, Italy). *Minerva Chir.* 31(9):494-500; 1976.

6554 RADIOLOGICAL SIGNS OF INTESTINAL ADAPTATIDN FOLLOWING JEJUNO-ILEAL BYPASS FOR OBESITY [Abstract]. (Eng.) Brekkan, A.; Riddervold, H. O.; Nygaard, K.; Fausa, O. (Rikshospitalet, Univ. Hosp., Oslo, Norway). *Scand J. Gastroenterol.* 10(34):26; 1975.

6555 INTESTINAL ADAPTATION AFTER JEJUNO-ILEAL BYPASS OPERATION FOR MASSIVE OBESITY [Abstract]. (Eng.) Iversen, B.; Schjonsby, H.; Skagen, D. W.; Solhaug, J. M.; Gluck, E. (Haukeland Hosp., Bergen, Norway). *Scand. J. Gastroenterol.* 10(34): 25-26; 1975.

6556 PNEUMATOSIS CYSTOIDES INTESTINALIS (PATHO-ANATOMICAL STUDY OF THREE CASES). (Ita.) Baldi, F.; Stefani, M. (Universita di Napoli, I Facolta di Medicina e Chirurgia, Istituto di Anatomia e Istologia Patologica, Naples, Italy). *Rev. Anat. Patol. Oncol.* 39(1):71-90; 1974.

6557 CONDITION OF HEMOCOAGULATION SYSTEM IN YOUNG CHILDREN WITH INTESTINAL TOXEMIA. (Rus.) Loverdo, R. G. (Rostov-na-Donu Medical Inst., Rostov-na-Donu, USSR). *Vopr. Okhr. Materin. Det.* 21(3):35-38; 1976.

See also, 6279, 6284, 6300, 6303, 6320, 6321, 6325, 6327, 6330, 6339, 6344, 6345, 6346, 6420, 6427, 6459, 6462, 6463, 6484, 6499, 6513, 6566, 6593, 6643, 6666, 6701, 6804, 6810, 6821, 6827, 6833, 6838, 6844, 6846, 6856, 6865, 6873, 6882, 6887, 6888, 6892, 6904.

SMALL INTESTINE

Malabsorption

6558 MEASUREMENT OF THE FUNCTIONAL UNSTIRRED LAYER THICKNESS IN THE HUMAN JEJUNUM IN VIVO [Abstract]. (Eng.) Read, N. W.; Levin, R. J.; Holdsworth, C. D. (Dept. Medicine and Physiology, Univ. Sheffield, England). *Gut* 17(5):387; 1976.

6559 FACTS ABOUT GLUTEN [Abstract]. (Eng.) Baker, P. G. (Frenchay Hosp., Bristol BS16 1LE, England). *Lancet* 2(7948):1307; 1975.

6560 COELIAC DISEASE IN IRAQI CHILDREN. (Eng.) Al-Hassany, M. (Dept. Pediatrics, Univ. Baghdad, Baghdad, Iraq). *J. Trop. Pediatr.* 21(4): 178-179; 1975.

6561 COELIAC DISEASE: A CAUSE OF VARIOUS ASSOCIATED DISEASES [Abstract]? (Eng.) Scott, B. B.; Losowsky, M. S. (St. James Hosp., Leeds LS9 7TF, England). *Lancet* 2(7942):956-957; 1975.

6562 STEATORRHOEA COMPLICATING THERAPY WITH MEFENAMIC ACID [Abstract]. (Eng.) Marks, J. S.; Gleeson, M. H. (Manchester Royal Infirmary, Manchester M13 9WL, England). *Br. Med. J.* 4(5994): 442; 1975.

6563 LACTOSE MALABSORPTION IN MEXICAN-AMERICAN CHILDREN. (Eng.) Woteki, C. E.; Weser, E.; Young E. A. (Univ. Texas Health Science Center, San Antonio, TX 78284). *Am. J. Clin. Nutr.* 29(1): 19-24; 1976.

6564 MALABSORPTION SYNDROME WITH IgG(λ) M COMPONENT: RESPONSE TO CHEMOTHERAPY. (Eng.) Prokipchuk, E. J.; Pruzanski, W. (St. Michaels Hosp., 160 Wellesley St. E., Toronto, Canada M4Y 1J3). *CMA J.* 114(10):922-924; 1976.

6565 SERUM IMMUNOGLOBULINS IN TROPICAL SPRUE. (Eng.) Misra, R. C.; Malhotra, S. K.; Malaviya, A. N.; Saha, K. (Maulana Azad Medical Coll., New Delhi, India). *Indian J. Med. Res.* 64(2):211-217; 1976.

6566 EXPLANATIONS FOR WEIGHT LOSS AFTER ILEOJEJUNAL BYPASS IN GROSS OBESITY. (Eng.) Pilkington, T. R. E.; Gazet, J. C.; Ang, L.; Kalucy, R. S.; Crisp, A. H.; Day, S. (St. George's Hosp., London, SW17 0QT, England). *Br. Med. J.* 1(6024): 1504-1505; 1976.

6567 BRAIN INVOLVEMENT IN WHIPPLE'S DISEASE. A CASE REPORT. (Eng.) Kitamura, T. (Neurological Inst. Vienna Univ., Vienna, Austria). *Acta Neuropathol. (Berl.)* 33(3):275-278; 1975.

See also, 6323, 6324, 6345, 6501, 6521, 6524, 6526, 6614, 6859.

6568 CLINICAL CYTOLOGICAL INVESTIGATIONS OF THE RECTUM AND DISTAL COLON. (Ger.)
Miczban, I.; Feher, M.; Gallyas, K. (Janos Korhaz, 1122 Budapest XII, Maros u. 38 II IZ, Hungary). *Tijdschr. Gastroenterol.* 18(3):161-170; 1975.

The role of cytological assay in the diagnosis of rectosigmoid pathology is explored. Mucosal specimens from 305 patients were obtained by an abrasion technique 0-30 cm from the anal ring during rectoscopy. Three types of cells were identified. One type consisted of columnar epithelial cells. A second type featured a round shape, cytoplasmic vacuoles and inclusions, and frequently a pyknotic nucleus ("Kolika" cells). The third type involved reticuloendothelial cells, including eosinophils, histiocytes, and plasma cells. Three main types of cytogram (CGM) originated from mixtures of the three cell types. The first CGM was cell-poor and included all three cell types. The second CGM was cell-rich; each of its three subtypes was dominated by one of the three cell types. The third CGM was characterized by heavy exfoliation, and probably consists of epithelial fragments. The role of this taxonomy in differential diagnosis is discussed.

6569 DIAGNOSTIC COLONOSCOPY. AN ASSESSMENT OF THE CLINICAL INDICATIONS. (Eng.) Schmitt, M. G., Jr.; Wu, W. C.; Geenen, J. E.; Hogan, W. J. (Rockford Clinic, Ltd., 2300 North Rockton Ave., Rockford, IL 61101). *Gastroenterology* 69(3):765-769; 1975.

Experience with 276 consecutive diagnostic colonoscopic examinations was analyzed to determine the specific clinical situations in which colonoscopy is beneficial in the diagnosis or management of colon diseases. Colonoscopy was successful in 260 patients. Using colonoscopy and biopsy, the location and type of colon disease was determined in 110 of 141 patients who had an abnormality on a colon x-ray examination. Of 43 patients with chronic inflammatory bowel disease, 31 were found to have more extensive colon involvement than had been indicated by a barium enema examination performed within 3 weeks before colonoscopy. In 13 patients with rectal polyps, colonoscopy revealed that 2 had polyps in the descending colon; this had not been demonstrated by proctoscopy or barium enema. Six cases of colonic polyps, one case of postirradiation colitis, two cases of blood within a colonic diverticulum, and one case of colonic carcinoma were diagnosed by colonoscopy. All of these patients were included in a group of 22 patients with chronic gastrointestinal bleeding who had normal x-ray examinations of the esophagus, stomach, and colon, as well as normal esophagogastroduodenoscopy. Nine patients who had a normal upper gastrointestinal endoscopic examination were colonoscoped for suspected acute lower gastrointestinal bleeding; in only two cases was the bleeding site (a solitary splenic flexure ulcer and a segmental inflammatory lesion, resp.) revealed by the procedure. Colonoscopy with biopsy demonstrated recurrent tumor in 2 of 13 postcolon surgery patients who had a colonic mucosal lesion described on a follow-up barium x-ray examination. No mucosal abnormality was detected by colonoscopy in six patients with chronic abdominal pain. Among nine patients with miscellaneous indications for colonoscopy, the procedure was beneficial in the evaluation of colonic endometriosis (3 patients) and rectal strictures (2) and in decompressing two patients with idiopathic pneumomegacolon. It is concluded that colonoscopy is indicated in patients with abnormalities on barium x-ray, chronic gastrointestinal bleeding, barium x-ray abnormalities that appear following colonic surgery, and selected patients with chronic inflammatory bowel disease.

6570 DISTAL COLOMYOTOMY: FOLLOW-UP OF 37 CASES. (Eng.) McGinn, F. P. (Southampton Univ. Medical Sch., Southampton, England). *Br. J. Surg.* 63(4):309-312; 1976.

The early postoperative results in 37 patients who underwent distal colomyotomy were evaluated, together with the 3- to 7-yr follow-up results of the 32 surviving patients. In each case, a longitudinal myotomy was made along the antimesenteric border of the sigmoid colon proximal to the level of the pelvic peritoneal reflection. In all cases, the myotomy was at least 25 cm long. The colon was perforated during surgery in seven patients. Wound abscess occurred in five patients, pelvic abscess in one, and wound dehiscence in one. There were two deaths following surgery. The first was a 76-yr-old man with widespread fecal peritonitis whose perforation was closed. The second death was a 68-yr-old woman who had had a previous transverse colostomy and drainage of a pericolic abscess; she died from a myocardial infarction and acute left ventricular failure. Most patients were discharged from the hospital within 14 days of admission. Three patients were discharged longer than 28 days after admission, and the reasons for this were a large wound abscess in two and a pelvic abscess in one. Among the 25 patients undergoing myotomy for uncomplicated diverticular disease and/or spastic colon, all were alive at the 3- to 7-yr followup, and 14 were asymptomatic. Of the six patients in this group operated on for spastic colon without any definite radiological evidence of diverticular disease, four were asymptomatic. Five of 10 patients who underwent surgery for complicated diverticular disease were asymptomatic; three of the remainder had persisting pain and two had died of unrelated diseases. Only 5 of 21 patients who agreed to have a barium enema examination showed any improvement at followup. The results of this operation for uncomplicated diverticular disease gave results comparable with, but no better than, optimum results after resection in other series. The results of myotomy for complicated diverticular disease were not as good as those obtained in recent studies with alternative forms of surgery.

6571 PLAIN FILM DIAGNOSIS OF RETROCECAL APPENDICITIS. (Eng.) Vaudagna, J. S.; McCort, J. J. (Santa Clara Valley Medical Center, 751 South Bascom Ave., San Jose, CA 95128). *Radiology* 117 (3):533-536; 1975.

The plain radiographic findings in 21 patients with acute retrocecal appendicitis were analyzed. In two patients, the appendix was completely retroperitoneal, and in the others, it was retrocecal with a partial or complete peritoneal covering. In all but three patients, the abdomen was examined in three projections: supine, left lateral decubitus with horizontal beam and anteroposterior upright. In order of frequency, the changes that suggested retrocecal appendicitis were: edema infiltration of the properitoneal fat between the ileac crest and the costal margin (11 patients), soft-tissue density interposed between the lateral fat line and ascending colon (9), a coprolith above the level of the anterior superior or ileac spine (7), gas in the appendix above the iliac crest (3), haustral irregularity of the lateral margin of the ascending colon (2), and retrocecal, extraperitoneal gas (1).

6572 RETROCECAL APPENDICITIS PRESENTING WITH AIR IN THE SUBHEPATIC SPACE.

(Eng.) Harned, R. K. (Univ. Nebraska Medical Center, Omaha, NB). *Am. J. Roentgenol.* 126(2):416-418; 1976.

Two cases in which the presence of subhepatic air played a decisive role in the diagnosis of clinically unsuspected appendicitis are reported. In the first patient, a 13-yr-old boy presenting with midabdominal pain and vomiting, air in a subhepatic abscess was the only abnormal plain roentgenographic finding. A barium enema was the initial contrast examination because of the patient's negative history for duodenal ulcer. In the second patient, a 66-yr-old man with a history of perforated duodenal ulcer, a barium meal examination was performed to exclude a diagnosis of recurrent perforation. The abdominal roentgenogram showed air in a subhepatic abscess, as well as evidence of abscess formation in the right paracolic gutter. In both cases, the free air on the supine abdominal roentgenogram assumed an oval configuration. Only the tip of the retrocecal appendix perforated distally into the subhepatic space, with resulting abscess formation and subsequent retrograde involvement of the right paracolic gutter by inflammatory exudate. Irritability of the right colon, present in both patients, was most likely secondary to this exudate. If the radiologist considers appendiceal disease when he finds air in the right subhepatic space, the patient may be spared unnecessary diagnostic procedures.

6573 SYNCHRONOUS ADENOCARCINOMA OF THE VERMIFORM APPENDIX AND THE RECTOSIGMOID: CASE REPORT AND REVIEW OF THE LITERATURE.

(Eng.) Birla, R. K.; Nolan, R. B.; Birla, S. R. (Beekman Downtown Hosp., 655 Park Ave., New York, NY 10021). *Dis. Colon Rectum* 18(8):678-684; 1975.

The unusual case of a patient with an adenocarcinoma of the appendix occurring simultaneously with a carcinoma of the rectosigmoid is presented. The patient, a 67-yr-old man, presented with a 24-hr history of right lower quadrant pain. A vague mass was found in this area. A meglucamine diatrizoate enema examination revealed an annular filling defect in the rectosigmoid suggestive of carcinoma and an irregularity at the tip of the cecum. Proctosigmoidoscopy revealed an ulcerating mucosal lesion with everted edges on the anterior wall, 18 cm from the anal verge. At exploratory celiotomy, one mass in the distal sigmoid and one in the area of the cecum and appendix were found. Metastatic adenocarcinoma was found in one of the four mesenteric nodes adjacent to the right colic vessels and in 7 of the 16 lymph nodes beside the inferior mesenteric vessels. A subtotal colectomy, with ileorectal anastomosis below the level of the peritoneal reflection, and a segmental resection of ileum adherent to the appendiceal mass were performed. The inferior mesenteric, right colic, and middle colic vessels were ligated at their respective origins, thus ensuring complete removal of the regional lymphatic drainage. A literature search failed to reveal another similar case.

6574 5-FLUOROURACIL (NSC-19893), DTIC (NSC-45388), BCNU (NSC-409962), AND VINCRISTINE (NSC-67574) IN AOVANCED COLORECTAL CARCINOMA.

(Eng.) von Eyben, F. E.; Larsen, V.; Pedersen, H. (Dept. Surgery, Finseninstitutet, Strandboulevarden 49, DK-2100 Copenhagen, Denmark). *Cancer Treat. Rev.* 60(1):29-32; 1976.

Combined therapy with 5-fluorouracil (5-FU), 5(3,3-dimethyl-1-triazeno)imidazole-4-carboxamide (DTIC), 1,3-bis(2-chloroethyl)-1-nitrosourea (BCNU), and vincristine for advanced colorectal carcinoma was evaluated in 33 patients. The patients received 5-day courses of 5-FU (10 mg/kg/day, i.v., days 1-5), DTIC (3 mg/kg/day, i.v., days 1 and 2), BCNU (1.5 mg/kg/day, i.v., day 1 only), and vincristine (0.025 mg/kg/day, i.v., day 1 only) at 5-week intervals. One patient achieved complete recovery (disappearance of tumor lesions and cancer symptoms), and six patients achieved partial recovery (at least 50% regression of a representative tumor lesion and no sign of progression). Five of 10 patients treated within 8 weeks of the detection of advanced cancer and 2 of 23 patients treated more than 8 weeks after the detection of cancer had complete or partial recovery. Toxicity was moderate (nausea, vomiting, diarrhea, stomatitis, and severe alopecia), although it necessitated a change to another regimen for one patient. One patient refused further chemotherapy, and one patient died due to severe bone marrow toxicity. The results suggest that the highest response rate to chemotherapy in advanced colorectal cancer is found in patients with recently detected lesions.

6575 FATAL OUTCOME IN A CHILD WITH PSEUDOMEMBRANOUS COLITIS.

(Eng.) Fee, H. J.; Kearney, J. P.; Ament, M. E.; Fonkalsrud, E. W. (UCLA Sch. Medicine, Los Angeles, CA 90024). *J. Pediatr. Surg.* 19(6):959-963; 1975.

The case of a 26-month-old boy in whom fatal pseudomembranous colitis developed after the administration of several antibiotics is presented. The patient was hospitalized for fever, nonbloody diarrhea, and leukocytosis. During the preceding 3 days of illness, he had been treated with an i.m. dose of streptomycin. On admission, erythromycin treatment was initiated, but the therapy was changed to i.v. ampicillin and i.m. kanamycin. The next day, the treatment was changed to i.v. chloromycetin because of worsening diarrhea and increasing fever. After the onset of abdominal distension and vomiting, the therapy was again changed to ampicillin and gentamicin. The diagnosis of antibiotic-induced pseudomembranous colitis was made on the basis of several factors: worsening diarrhea and appearance of fever acutely after antibiotics were started, stool cultures free of pathogens, and proctosigmoidoscopy revealing the classic morphologic changes of pseudomembranous colitis (mucosal edema and friability with the presence of multiple plaques). Despite the absence of free intraabdominal air on repeated radiograms, the patient's progressively deteriorating course, with clear evidence of peritonitis, made the diagnosis of perforated colon likely. Laparotomy revealed that the colon was necrotic, with denuded epithelium; the submucosa was hemorrhagic, and there were several perforations. A proctocolectomy and ileostomy were performed, and the patient was started on i.v. gentamicin and cleocin. The patient's condition improved until the eighth postoperative day, when his symptoms returned. Despite intraabdominal catheterization, irrigation of the peritoneal cavity with a cephalothin solution, and treatment with methyl prednisolone acetate (2 mg/kg, i.v.), sepsis recurred. Multiple dilated venous collaterals developed over the entire abdominal and anterior chest wall, suggesting venous obstruction with portal hypertension. Liver function deteriorated, and the patient died in cardiorespiratory arrest. Postmortem examination revealed abscesses involving 80% of the liver. Neither vena caval nor portal vein obstruction was found. Proctosigmoidoscopic examination should be used routinely to detect pseudomembranous colitis in the evaluation of both adults and children with refractory diarrhea following antibiotic therapy.

6576 FATAL PSEUDOMEMBRANOUS ENTEROCOLITIS FOLLOWING CLINDAMYCIN THERAPY.

(Eng.) Dane, T. E. B.; King, E. G. (Craigavon Area Hosp., Craigavon, Co. Armagh, N. Ireland). *Br. J. Surg.* 63(4): 305-308; 1976.

A fatal case of pseudomembranous enterocolitis occurring after p.o. and i.v. clindamycin therapy is reported in a 55-yr-old man who had undergone resection of the sigmoid colon for diverticular disease. Ten centimeters of diseased bowel at the junction of the descending and sigmoid colon were resected with a two-layer end-to-end anastomosis. A small abscess cavity was opened during mobilization of the diseased colon. Because of this, the patient was given 300 mg clindamycin i.v., and the anastomosis was protected by dividing the transverse colon and establishing the proximal end as an end colostomy. The initial postoperative progress was satisfactory, and clindamycin therapy was continued for 6 days (150 mg, i.v., 4-hourly for 4 days and 300 mg, p.o., 6-hourly for 2 days). On the 11th postoperative day, the patient developed abdominal pain, vomiting, and subsequent watery colostomy drainage and vascular collapse. The course of the disease process was complicated by delayed recognition of the pseudomembranous enterocolitis, further therapy with clindamycin (450 mg, i.v., 4-hourly), sepsis, and renal failure. At laparotomy, the cecum and terminal 180 cm of ileum were grossly edematous and discolored, but the jejunum and the colon distal to the colostomy were normal. Gram-negative septicemia was discovered, and therapy with penicillin, chloramphenicol, and methylprednisolone was begun. Clindamycin was discontinued. Although the patient's condition improved, massive hematemesis caused his death. At autopsy, the unusual sparing of the upper small bowel and the large bowel distal to the colostomy was confirmed histologically. The stomach contained fresh blood, and its mucosa had many superficial erosions; the gastric hemorrhage from these erosions was probably related to stress and corticosteroid therapy. The most interesting features of this case are the extensive small bowel involvement by the disease and the sharp demarcation of the process by the transverse colostomy, with complete sparing of the distal bowel. The latter finding suggests that local factors in the bowel are at least contributory in the pathophysiology of clindamycin-associated pseudomembranous enterocolitis.

6577 BRAN TABLETS AND DIVERTICULAR DISEASE.

(Eng.) Taylor, I.; Duthie, H. L. (Royal Infirmary, Sheffield, England). *Br. Med. J.* 1(6016): 988-990; 1976.

High-roughage diet (HRD), Normacol plus antispasmodic, and bran tablets (18 g/day) were compared in a crossover trial in 20 patients with symptomatic diverticular disease. Half of the patients received either HRD for 1 month or Normacol plus antispasmodic for 1 month, and half received bran tablets for 1 month. Treatments were then crossed over. All patients experienced some improvement in symptoms (degree of pain, bowel habit, and amount of distension) with each treatment; 20% were entirely asymptomatic after treatment with HRD, 40% after Normacol, and 60% after bran tablets. The mean stool weight before treatment was 79 g. On both Normacol and bran tablets, the stool weight increased significantly, to 105 g and 121 g, resp., after 1 month. The mean transit time before treatment was 96.6 hr, which was significantly decreased by all three treatments (76.4 hr with HRD, 71.7 hr with Normacol, and 56.1 hr with bran tablets). Bran tablets were significantly more effective than either Normacol ($p<0.05$) or HRD ($p<0.001$). The mean percentage of motility before treatment (14.2%) was reduced to within normal limits (6.5%) by bran tablets, but not by HRD or Normacol. Rapid electrical activity of colonic smooth muscle was present in 80% of the subjects before treatment; 50%, 60%, and 40% of patients had rapid activity after treatment with HRD, Normacol, and bran, resp. These results suggest that in diverticular disease, all indices of colonic pathophysiology can be restored to normal. The theory that diverticular disease results from a normal colon being subjected to abnormal dietary stress rather than from a primary or constitutional colonic abnormality is supported. The bran tablets were both convenient and acceptable.

6578 THE NATURAL HISTORY OF DIVERTICULAR DISEASE OF THE COLON. A REVIEW OF 238 CASES.

(Eng.) Podesta, M. T.; Pace, J. L. (Dept. Anatomy, Royal Univ. Malta, Malta). *Chir. Gastroenterol.* 9(3):371-374; 1975.

A review of 238 patients with the radiological diagnosis of diverticular disease is presented, with regard to the age and sex distribution, the mode of presentation, and the course and management of the disease. The male:female ratio was 128:110. In both sexes, more cases presented in the seventh decade than in any other. The average age among 25 patients who had extensive colonic involvement (i.e., beyond the left colon) was 63.4 yr, while patients with less extensive disease had an average age of 62.4 yr. The sigmoid colon alone was involved in 49% of the cases, while involvement of the descending colon and/or the sigmoid colon occurred in another 34.8% of the cases. Thirty-six percent of the patients with extensive colonic involvement had symptoms for less than 1 month, while 25% of patients with sigmoid disease and 41% of patients with involvement of the sigmoid plus descending colon had less than 1-month histories. Fifty-nine percent of the patients required hospitalization. The correct diagnosis was made in only 26 of 216 hospitalized patients. Only 42 patients were treated surgically. The usual operative procedure in the acute stage was appendectomy and cecostomy, or colostomy. One stage resection was the most common elective procedure. In 40% of cases, elective surgery was undertaken primarily for concomitant malignant disease. Of the 42 surgically treated patients, 21.4% died, 7.1% have severe symptoms, 35.7% have mild symptoms, and 19.0% are asymptomatic. Of the 196 patients who did not undergo surgery, 17.9% are dead, 6.1% have severe symptoms, 24.0% have mild symptoms, and 21.4% are asymptomatic. Associated pathological conditions included cholecystitis and/or cholelithiasis (22 patients), gastric and/or duodenal ulcer (14), appendicitis (17), hiatus hernia (15), other hernias (54), colonic malignancy (15), and malignancy elsewhere (15).

6579 CHRONIC ADYNAMIC BOWEL SIMULATING HIRSCHSPRUNG'S DISEASE.

(Eng.) Kapila, L.; Haberkorn, S.; Nixon, H. H. (Children's Hosp., Chestnut Grove, Nottingham, England). *J. Pediatr. Surg.* 10(6):885-892; 1975.

A case of chronic adynamic bowel simulating Hirschsprung's disease is reported in a female infant, and three previous cases are reviewed. Functional intestinal obstruction could be excluded in all cases. All had similar presenting features, including a head circumference below normal. In spite of the presence of many features of Hirschsprung's disease, such as vomiting, abdominal distension, and constipation, normal ganglia were present. There was also an absense of bowel sounds. In all cases, conservative treatment failed, and decompression by colostomy or ileostomy failed, until assisted by irrigations or drugs. In all cases, the bowel was thin, dilated, and adynamic. In the present case, the only clue to etiology was a raised immunoglobulin M level and culture of cytomegalovirus from urine specimens. The other patients were not studied for virus. The bowel histology was normal in all cases. Therapy with cholinergic drugs or alpha or beta blockers was ineffective. In the present case, cerulein produced intestinal activity, and its use was continued for 6 months with no side effects. The patient died of complications of a closed loop obstruction resulting from adhesions. Of the three previous cases, two died; the third recovered after treatment with i.v. fluids, hydrocortisone, and methicillin. It is suggested that cerulein be investigated as a treatment for this condition.

6580 CALCIFIED INTRALUMINAL MECONIUM IN NEWBORN MALES WITH IMPERFORATE ANUS: ENTEROLITHIASIS IN THE NEWBORN.

(Eng.) Berdon, W. E.; Baker, D. H.; Wigger, H. J.; Mitsudo, S. M.; Williams, H.; Kaufmann, H. J.; Shapiro, L. (Babies Hosp., Columbia-Presbyterian Medical Center, New York, NY 10032). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(2):449-455; 1975.

Five cases in which multiple foci of calcified meconium were noted on preoperative abdominal roentgenograms of newborn males with imperforate anus are reported, and three previous cases are reviewed. In the five cases studied, all had supralevator rectal atresia. In four, fistula was demonstrated between the distal colon and either the bladder or urethra; in the fifth, autopsy was incomplete. None had meconium peritonitis. Rectourinary fistula was also present in one of the three reviewed cases. In a second, a fistula may have been present, but was missed. In all cases, the calcifications were entirely intraluminal. The findings suggest that the calcifications may represent an interaction between urine and meconium, and demonstrate that in male infants with imperforate anus, intraluminal meconium enterolithiasis is strongly suggestive of a rectourinary fistula.

6581 ACUTE PERFORATION OF THE COLON ASSOCIATED WITH CHRONIC CORTICOSTEROID THERAPY.

(Eng.) Warshaw, A. L.; Welch, J. P.; Ottinger, L. W. (Massachusetts General Hosp., Boston, MA 02114). *Am. J. Surg.* 131(4):442-446; 1976.

The clinical findings in 13 patients treated with steroids who developed acute perforation of the colon are presented. Steroid administration averaged 3.4 yr (11 days to 10 yr), and only three patients received steroids for less than 2 months. The steroids included prednisone (5-100 mg/day) and dexamethasone (4-32 mg/day). The most common presenting complaint was abdominal pain (92%); abdominal tenderness occurred in all patients, and fever occurred in 92%. The clinical and laboratory findings were considered conclusive enough to warrant urgent surgical intervention in 10 patients, although the diagnosis of colonic perforation was correctly made prior to operation only three times Failure to recognize that a perforation had occurred delayed or deterred surgical exploration in three cases. In 9 of 11 patients for whom there was surgical or autopsy information, there was no walling off of the perforation site or adherence of adjacent viscera. The perforation was most often found in the sigmoid colon (8 patients), but also occurred in the cecum (3), at the hepatic flexure (1), and at multiple points along the transverse and descending colon (1). In five patients, the perforation was located close to diverticula and could not be distinguished pathologically from perforated diverticulitis occurring in the absence of steroid therapy. In the other eight patients, the perforations were distinctly unusual. In five patients, single punched-out transmural ulcers were found. Three of the five patients who underwent resection of the perforated segment survived. Four patients treated by colostomy and drainage survived, but one whose perforated hepatic flexure was exteriorized did not. The evidence suggests that corticosteroids can be responsible for ulceration and perforation of the colon, either by direct injury or by interference with normal mechanisms of bowel repair.

6582 Polyposis coli ASSOCIATED WITH FIBROSIS OF MESENTERY, MESOCOLON AND RETROPERITONEAL TISSUES: A RARE VARIANT OF GARDNER'S SYNDROME. (Eng.) Carneiro Chaves, F. J. Z.; Cruz, I.; Lopes, C.; De Morais, M. (Hosp. Santa Maria, Lisbon 4, Portugal). *Am. J. Gastroenterol.* 65(2):163-167; 1976.

The rare case of a 48-yr-old black man with multiple colonic polyposis, cutaneous and soft tissue tumors, and multiple osteomatosis (Gardner's syndrome) is presented. The patient had a 1-yr history of abdominal pain and rectal bleeding. A tender mass was palpable on the right flank. Sigmoidoscopy and barium enema examination revealed multiple polyps. A radiographic bone survey demonstrated diffuse areas of sclerosis in the cancellous bone of the maxilla and mandible. The right frontal sinus was opacified. There were supernumerary and unerupted teeth, and all long bones had an irregular, thickened cortex. At laparotomy, the small bowel was found to be suspended from a very hard and retracted mesentery. Fibrosis had progressed to the cecum and ascending colon. There was also fibrosis of the mesocolon extending to the posterior peritoneum. Colectomy was not possible. Histologic examination of biopsy specimens of the mesentery and retroperitoneal tissues revealed a noninflammatory fibrous tissue hyalinized in some areas. Despite continuing abdominal pain and rectal bleeding over a 2-yr follow-up period, the patient did not lose weight, and there was no evidence of colonic malignancy. This is the first reported case of Gardner's syndrome occurring in an African black patient.

6583 COLONOSCOPY IN DIAGNOSIS AND TREATMENT OF NEW GROWTHS IN THE LARGE INTESTINE. (Rus.) Fedorov, V. D.; Pokrovsky, A. G.; Strekalovsky, V. P.; Kuzmin, A. I. (Scientific Res. Lab. Proctology with Clinic, Russian SSR Ministry Public Health, Moscow, USSR). *Klin. Med. (Mosk.)* 54(3):57-62; 1976.

6584 POSSIBILITIES OF REVASCULARIZATION OF MOBILIZED SECTIONS OF THE COLON IN EXTENDED RESECTIONS OF ITS LEFT PART. (Rus.) Stepanov, V. S.; Khokhlov, P. G. (Rostov Medical Inst., Rostov, USSR). *Khirurgiia (Mosk.)* (3):8-13; 1976.

6585 ADAPTATION FOR SIGMOIDOSCOPIC SNARE. (Eng.) Ratan, J.; Rozen, P. (Ichilov Hosp., Tel Aviv, Israel). *Gastrointest. Endosc.* 22(1):49; 1975.

6586 X-RAY DIAGNOSIS OF LOCAL COMPLICATIONS FOLLOWING ANTERIOR RESECTION OF THE RECTUM AND SIGMOID COLON. (Rus.) Sidorov, V. S.; Shniger, N. U.; Pokrovsky, G. A. (Scientific Res. Lab. Proctology with Clinic, Russian SSR Ministry Health, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (5):30-36; 1975.

6587 X-RAY DIAGNOSIS OF CHANGES OF THE LARGE INTESTINE IN DISEASES OF THE FEMALE SEXUAL ORGANS. (Rus.) Rubinov, R. S.; Samokhina, N. V. (Tadzhik Medical Inst., Dushanbe, USSR). *Vestn. Rentgenol. Radiol.* (1):57-61; 1976.

6588 FEATURES PECULIAR TO THE CLINICAL PICTURE AND DIAGNOSIS OF AFFECTIONS INVOLVING THE RECTUM IN GASTROENTEROLOGICAL PATIENTS. (Rus.) Yukhvidova, Zh. M. (Central Scientific Res. Inst. Gastroenterology, Moscow, USSR). *Sov. Med.* (2):124-128; 1976.

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See also, 6275, 6304, 6326, 6329, 6390, 6420, 6446, 6485, 6533, 6538, 6540, 6544, 6549, 6556, 6695, 6827, 6833, 6846, 6854, 6860, 6869, 6880, 6882, 6888, 6899.

LARGE INTESTINE

Ulcerative Colitis

6633 TISSUE DEMONSTRATION OF CARCINOEMBRYONIC ANTIGEN (CEA) IN ULCERATIVE COLITIS. (Eng.) Isaacson, P. (Southampton Univ. Hosp., Southampton, England). *Gut* 17(7):561-567; 1976.

To determine whether premalignant foci can be identified by an increased carcinoembryonic antigen (CEA) content, protocolectomy specimens from nine patients with ulcerative colitis were examined by an immunoperoxidase technique. Goat antiCEA and horse antigoat immunoglobulin were used. Only carcinoma specimens and mucosa specimens showing premalignant change stained positively for CEA. Areas of active or chronic inactive disease were negative, even when inflammatory dysplasia was present. Metaplastic Paneth cells stained positively, as did Paneth cells from the ileum of one patient with ileorectal anastomosis. The results show that detection of CEA by this method is a reliable indicator of premalignant change or carcinoma-*in-situ* in ulcerative colitis.

6634 IMMUNOHISTOCHEMICAL OBSERVATION OF IMMUNOGLOBULINS, FIBRINOGEN AND C_3-COMPLEMENT IN THE COLONIC MUCOSA OF ULCERATIVE COLITIS. (Jpn.) Tamura, M.; Kimura, K.; Matsui, T.; Morita, T.; Higuchi, M.; Tsujii, T.; Miyatake, M.; Inatsugi, N.; Shiratori, T. (First Dept. Surgery, Nara Medical Univ., Nara, Japan). *J. Nara Med. Assoc.* 26(3):287-293; 1975.

See also, 6568.

PANCREAS

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6640 STUDIES ON ECTOPIC ACTH-PRODUCING TUMORS. III. AN ECTOPIC MELANOCYTE-STIMULATING HORMONE: GEL CHROMATOGRAPHIC FINDING AND TIME-LAPSE COLOR CHANGE OF FROG SKIN. (Eng.) Nakamura, M.; Tanaka, A.; Kawabata, T.; Yamamoto, H.; Imura, H. (Shionogi Research Lab., Shionogi & Co., Ltd., Osaka, Japan). *Jpn. J. Clin. Oncol.* 5(1):29-32; 1975.

6641 HAEMOBILIA FROM PANCREATIC CYSTADENOMA. (Eng.) Hislop, I. G.; Bourne, A. J.; Paull, C. G. (Queen Elizabeth Hosp., Woodville Rd., S. Australia 5011). *Aust. N.Z. J. Surg.* 45(3): 263-264; 1975.

6642 PANCREATIC NEOPLASM IN A 13-YEAR-OLD GIRL. (Eng.) Beal, J. M. (No affiliation given). *Ill. Med. J.* 147(1):44-46; 1975.

6643 UNUSUAL CASE OF MASSIVE GASTROINTESTINAL BLEEDING—PSEUDOANEURYSM OF THE HEAD OF THE PANCREAS. (Eng.) Prasad, J. K.; Chatterjee, K. S.; Johnston, D. W. B. (Westminster Hosp., P.O. Box 5701, London, Ontario N6A 4S2, Canada). *Can. J. Surg.* 18(5):490-491; 1975.

6644 PANCREATIC TRAUMA. (Eng.) Tolins, S. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *Pahlavi Med. J.* 5(4):600-606; 1974.

See also, 6299, 6300, 6319, 6327, 6347, 6373, 6374, 6377, 6380, 6457, 6549, 6550, 6645.

PANCREAS

Pancreatitis

6645 HEMATEMESIS AND MELENA AS THE FIRST SYMPTOMS OF PANCREATIC DISEASE. (Ita.) Porta, G. C.; Scotti, F.; Rossi, G. M.; Gramazio, G. F.; Taglibue, M. (Ospedale S. Gerardo Tintori, Circolo di Monza, Italy). *Arch. Ital. Chir.* 98(4):491-499; 1974.

Four cases (4 men, aged 40-48 yr) of pancreatic disease are reported. The first symptoms were intestinal hemorrhages caused by the rupture of the gastroesophageal varices which in turn was caused by segmentary portal hypertension. Splenoportography was crucial for the diagnosis and choice of surgery. In the first case (diffuse pancreatitis), splenoportography revealed complete obstruction of the splenic vein; this was indicative of severe retropancreatic inflammation, a pancreatectomy was impossible, and a splenectomy was performed because of the irreversability of the stenosis. In the second case (a pseudocyst), splenoportography revealed a stenosed splenoportal vein; portal hypertension disappeared following a simple by-pass. In the third case, (pseudocyst), examination revealed an enlarged spleen, an obstructive vascular lesion, and a normal splenic vein beyond the hilus of the spleen; a splenectomy was performed. In the fourth case (an adenocarcinoma), the splenic vein was completely obstructed; surgery removed a neoplasia of the tail and body of the pancreas infiltrating the hilus of the spleen. A gastroenteroanastomosis was performed because of stenosis. Thus, a digestive hemorrhage can be of pancreatic origin. Angiography, and especially splenoportography, are essential for the diagnosis and choice of treatment.

6646 "SENILE" CHRONIC PANCREATITIS—A NEW NOSOLOGICAL ENTITY? OBSERVATION OF 38 CASES. INDICATIONS OF VASCULAR ETIOLOGY AND RELATIONSHIPS WITH PRIMARY PAINLESS CHRONIC PANCREATITIS. (Ger.) Ammann, R.; Sulser, H. (Departement fur Innere Medizin, Kantonsspital, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 106(3):429-437; 1976.

The clinical picture, differential diagnosis, complications, histology, and prognosis of idiopathic senile chronic pancreatitis is analyzed. Of 170 patients with confirmed chronic pancreatitis (CP), the pathogenesis of 47, including 38 "senile" cases (31 men), remained unclear. Nine patients averaged 28.7 yr of age, and 38 averaged 61.7 yr. The clinical course was painless in 28 of the 38 in the senile group, with weight loss and diarrhea being the typical symptoms; alcohol consumption was reported in 17. Pelvic or lower limb vascular disturbances occurred in 12, and coronary stigmata in 9. Frank exocrine or endocrine pancreatic deficit was present in the majority. Local complications (pseudocysts or obstructive icterus) were rare, and in no case were they or the parent pancreatitis responsible for the mortality of 17 at the average age of 68 yr. Idiopathic senile CP histology was uniform: focal acini atrophy, extensive intra- and perilobular sclerosis, minimal inflammatory infiltration, and no fresh necroses or calcification. A majority of idiopathic senile CP patients presented with one or more atherosclerotic risk factors, suggesting a vascular factor in its pathogenesis. In contrast to painless chronic pancreatitis, which is a syndrome, idiopathic senile CP is thought to represent an etiologically uniform disease state.

6647 FUNCTIONAL RESPIRATORY DISTURBANCES IN PATIENTS WITH CHRONIC PANCREATITIS. (Fre.) Paris, J.; Guerrin, F.; Gerard, A.; Weber, J. C. (Hopital Regional de Lille, 1, place de Verdun, 59000 Lille, France). *Bull. Acad. Natl. Med. (Paris)* 159(5):410-416; 1975.

Pulmonary function studies were undertaken in 57 men (19 to 65 yr old; average age, 41 yr) hospitalized for chronic pancreatitis. Symptoms of disease had been present for several months to 10 yr (average, 2 yr and 4 months). Diabetes was present clinically in 4, and latent diabetes was present in 15. A careful study revealed 22 patients with a history of pneumopathology (chronic respiratory insufficiency, x-ray evidence of tuberculosis or other abnormalities, or respiratory infection); these patients were considered as a separate group. Blood gas studies, spirometry, carbon monoxide transfer, and alveolar exchange revealed four categories of malfunction: (1) ventilation deficit in 9, (2) total carbon monoxide transfer reduced by more than 15% in 21, (3) light or moderate hypocapnia with normocapnia in 22, and (4) decreased alveolar exchange and pulmonary passage of oxygen in 8/12 cases tested for changes in ventilation efficacy. Respiratory disorders were often associated in the same patient and 32/35 patients in the group with no history of pneumopathology had evidence of malfunction. The other group of 22 patients had a higher percentage of respiratory disorders. The absence of a relation between the severity or duration of the pancreatitis and the respiratory malfunction appears to rule out their interdependence.

6648 THE USE OF AMPICILLIN IN ACUTE PANCREATITIS. (Eng.) Craig, R. M.; Dordal, E.; Myles, L. (Veterans Admin. Hosp., Chicago, IL 60611). *Ann. Intern. Med.* 83(6):831-832; 1975.

6649 AN ELECTRON MICROSCOPIC STUDY ON CHRONIC PANCREATITIS. (Eng.) Kibayashi, H.; Ogata, T. (Okayama Univ. Medical Sch., Okayama, Japan). *J. Clin. Electron Microsc.* 6(3/4):318-319; 1973.

6650 THE DIAMETER OF THE PANCREATIC DUCT IN RELATION TO THE SIZE OF THE ORGAN IN CHRONIC PANCREATITIS. (Ger.) Nette, L. (Rontgendiagnostisches Zentralinstitut der Universitat Zurich, Ramistrasse 100 CH-8006 Zurich, Switzerland). *Leber Magen Darm* 6(1):15-18; 1976.

6651 CIRCULATORY AND HORMONAL CHANGES DURING ACUTE PANCREATITIS [Abstract]. (Eng.) Daniels, W. L.; O'Barr, T. P.; Miller, J. G.; Seab, J. (Clinical Investigation Service, Fitzsimons AMC, Denver, CO 80240). *Fed. Proc.* 35(3):393; 1976.

6652 ACUTE PANCREATITIS AS A CONSEQUENCE OF THE CONTINUOUS AUGMENTED SECRETION AND CIRCULATION OF DIGESTIVE ENZYME [Abstract]. (Eng.) Gotze, H.; Rothman, S. S. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *Fed. Proc.* 35(3):393; 1976.

6653 LIPID CHANGES IN ACUTE PANCREATITIS. (Spa.) Romero, R.; Ras, M. R.; Frison, J. C.; Rubies-Prat, J.; Masdeu, S.; Caralps, A.; Bonnin, J.; Bacardi, R. (Ciudad Sanitaria de la Seguridad Social, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(2):181-186; 1976.

6654 HEREDITARY PANCREATITIS: CHRONIC RECURRENT PANCREATITIS IN TWO DANISH FAMILIES. (Dan.) Marcussen, H.; Nicolaisen, T. (Rigshospitalet, Copenhagen, 2100, DK, Denmark). *Ugeskr. Laeger* 138(5):269-272; 1976.

6655 CHRONIC PANCREATITIS: CLINICAL AND LABORATORY FINDINGS AND FOLLOW-UP IN 78 CASES. (Spa.) Valenzuela, J. E.; Fernandez, O. R. (Departamento de Medicina Experimental, Universidad de Chile, Sede Santiago Norte, Chile). *Rev. Med. Chil.* 103(4):251-255; 1975.

6656 NECROTIC HEMORRHAGIC PANCREATITIS AS AN IMMEDIATE COMPLICATION OF SURGERY ON THE BILIARY TRACT. (Spa.) Longo, O.; Richardet, E.; Flores; Granero (Cuarta Catedra de Clinica Quirurgica [U.N.C.], Hosptial San Roque, Cordoba, Argentina). *Rev. Es. Enferm. Apar. Dig.* 47(2):255-262; 1976.

6657 SOME GEOGRAPHICAL ASPECTS OF CHRONIC RELAPSING PANCREATITIS. (Pol.) Herfort, K.; Bartos, V.; Kotrlik, J. (Department General Medicine, Charles Univ., Prague, Czechoslovakia). *Pol. Arch. Med. Wewn.* 55(1):25-32; 1976.

See also, 6198, 6202, 6296, 6375, 6376, 6378, 6635, 6638, 6643, 6816.

6658 USE OF KINESIMETRY FOR THE EXPLORATION OF THE BILE DUCTS.

(Fre.) Larrieu, H. (Hopital Antoine-Beclere, F 92140 Clamart, France). *J. Radiol. Electrol. Med. Nucl.* 56(8/9):633-634; 1975.

The value of kinesimetry, as compared to cholangiography, radiomanometry, and other techniques for studying bile duct pathology was evaluated. Kinesimetry provided more data and the method can be utilized peroperatively at the start of operative procedures; however, morphine and atropine must be excluded from anesthesia. Kinesimetry can measure bile duct pressure postoperatively by the use of a Kehr drain in the unanesthetized patient. Pressure in bile duct in response to perfusion of 2-10 ml/min of opaque medium is measured by a photoelectric cell system. The examination usually lasts about 30 min and is followed radiographically. Kinesimetry is the only method of diagnosis for an enlarged, unobstructed common bile duct with low pressure, a low pressure Wirsungian reflux, and duodeno-oddian synergy (effect of disturbed duodenal peristalsis on biliary pressure). More important, the method diagnoses the presence of a functioning sphincter of Oddi and prevents unnecessary sphincterotomies.

6659 BILE ACIDS IN CLINICAL MEDICINE. DISTURBANCES IN THE ENTEROHEPATIC CIRCULATION.

(Eng.) Manier, J. W. (Marshfield Clinic, 1000 North Oak Ave., Marshfield, WS 54449). *Wis. Med. J.* 75(5):S40-42; 1976.

Three syndromes that result in interruption of the enterohepatic circulation of bile acids and their detection and treatment are described. The first syndrome is deconjugation of bile acids in the small intestine due to bacterial overgrowth. This results from any situation that interferes with peristalsis (surgically constructed blind loops, enterocolonic fistuli, strictures, diverticuli, and diseases such as scleroderma, amyloidosis, and pseudo-obstruction). The two other syndromes result from the bypass or resection of varying amounts of ileum. If the loss is small (30-100 cm), the liver can synthesize sufficient bile acids to compensate for the fecal loss. There will, however, be an increase in bile acids presented to the colon, which can produce excessive colonic water and electrolyte secretion with resultant watery diarrhea. In patients with a greater than 100-cm ileal loss, the loss of bile acid absorptive sites is so great that the liver can no longer synthesize sufficient replacements. Insufficient bile acids are present for micelle formation, and steatorrhea results. The administration of a bile acid sequestering resin, cholestyramine, has resulted in a correction of diarrhea resulting from the loss of less than 100 cm of ileum. In patients with a loss of greater 100 cm, limitation of long chain triglycerides and their replacement with medium and short chain triglycerides results in improvement, since the medium and short chain triglycerides can be absorbed without micelles. By having subjects who had previously ingested ^{14}C-labeled choleglycine breathe into a basic solution (hyamine) to which a color indicator (phenothalein) has been added, a direct quantitation of the degree of bacterial deconjugation can be obtained by measuring the amount of trapped ^{14}C by liquid scintillation. By measuring fecal radioactivity, the syndromes can be further differentiated.

6660 THE BSP TEST WITH CONTINUOUS PERFUSION IN THE DIAGNOSIS AND MONITORING OF THERAPY FOR HEPATOBILIARY DISEASE.

(Fre.) Borg, R. (Universite Bordeaux II, France). *Rev. Fr. Gastroenterol.* (106):47, 49, 51-52; 1975.

A method for evaluating liver function experimentally by the continuous perfusion of BSP is described. After i.v. perfusion of BSP at a rate of 3.82 mg/min, femoral artery and hepatic vein concentrations increased linearly; the concentrations always differed by 3.2 mg. If BSP is injected in high concentrations over a prolonged period of time, the quantity excreted in the bile reaches a maximum (T_m). T_m also theoretically represents maximum hepatic fixation. A formula was derived for evaluating liver function based on the BSP level in the plasma compared to the maximum BSP level excreted by bile and the variation of plasma levels as a function of time. This method permits the study of the influence of treatment on the outcome of hepatobiliary disease such as hepatic cholestasis.

6661 DIAGNOSTIC VALUE OF γ-GLUTAMYL TRANSPEPTIDASE IN LIVER DISEASES.

(Ger.) Thefeld, W. (Institut fur Sozialmedizin und Epidemiologie des Bundesgesundheitsamtes, 1 Berlin 33, Thielallee 88/92, W. Germany). *Med. Welt* 26(47):2139-2141; 1975.

A review of the literature on the diagnostic potential of gamma-glutamyl transpeptidase (GGT) in liver pathology is presented. The percentage of patients with elevated GGT levels shows a wide variation between liver diseases: 82-100% for acute virus hepatitis, 0-94% for chronic persisting hepatitis, 44-100% for acute chronic hepatitis, 74-100% for posthepatitic cirrhosis, 68-100% for fatty liver, 93-100% for cholestasis, 98-100% for cholecystitis, 87-100% for liver metastases, and 92-96% for hepatosteatosis. There is a consensus that the normal GGT range is 23-38 U/l for men and 14-35 U/l for women, and that the GGT level bears no correlation with levels of alkaline phosphatase, leucine aminopeptidase, or transaminases (TR). GGT data contribute no more information than TR in acute viral hepatitis. Increases in the relatively low GGT elevation in chronic persisting hepatitis can be prognostic of the onset of the active form. GGT has a supplementary role in differentiating ethanol hepatitis, fatty liver, and posthepatitic cirrhosis. GGT sensitivity to short-term effects of alcohol could not be confirmed. In obstructive jaundice, the high elevations have diagnostic value in conjunction with transaminase depression. High increases can suggest cholangitis, but the picture with biliary cirrhosis is equivocal. GGT is diagnostically crucial in cirrhotogenic primary liver carcinoma and in metastatic disease where histology is impossible. Its behavior in xenogeneic hepatotoxicity is paradoxical.

6662 IMMUNOPATHOLOGICAL PHENOMENA IN LIVER DISEASES. (Ger.) Lehmann, H.-U.; Renger, F.; Dokert, B.; Morenz, J.; Zugehor, M. (Med. Klinik der Med. Akademie, 8019 Dresden, Fetscherstrasse 74, E. Germany). *Z. Gesamte Inn. Med.* 30(23):258-261; 1975.

The prognostic, differential diagnostic, and therapeutic indicator roles of autoantibodies in liver pathology were explored in 400 patients. The highest antibody titer against mitochondria occurred in all eight patients with primary biliary cirrhosis; positive responses were achieved in 35 of 53 patients with liver cirrhosis, 32 of 63 with infectious hepatitis, 11 of 23 with chronic persisting hepatitis, and 28 of 38 with chronic active hepatitis. Against smooth muscle, there were positive responses in 16 patients with chronic active hepatitis, 6 with chronic persisting hepatitis, 9 with cirrhosis, 4 with infectious hepatitis, and 4 with biliary cirrhosis. Against cell nuclei, chronic active hepatitis showed the highest titer, with responses in eight patients; responses were obtained from none of the patients with chronic persisting hepatitis, from one with infectious hepatitis, one with cirrhosis, and one with biliary cirrhosis. The acute viral phase of hepatitis was weakly positive, and ethanol cirrhosis, completely negative. Very weak responses were elicited to hepatitis B antigen in all hepatitis groups. All strongly positive chronic active hepatitis patients were hepatitis B-negative. Based on antibody response, two patients with biliary cirrhosis and one with chronic active hepatitis were successfully treated with prednisone or a prednisone-azathioprine combination. If 1:160 is established as the limiting titer, the antibody spectrum appears to be valuable in differential diagnosis.

6663 LIPOPROTEINS IN LIVER DISEASES. (Ger.) Seidel, D. (Med. Univ.-Klinik [Ludolf-Krehl-Klinik], 69 Heidelberg, Bergheimer Strasse 58, W. Germany). *Med. Welt* 26(47):2131-2133; 1975.

The current status of elevated plasma lipoproteins (LP) in the differential diagnosis of liver dysfunction is reviewed. The abnormal LP-X is the most sensitive test for intra- or extrahepatic cholestasis. The presence of hypertriglyceridemia, with the accumulation of triglyceride-rich serum LP due to a lipase deficiency, can also be pathognomic of cholestasis-conditioned liver disease. The disappearance of pre-beta- and alpha-LP bands in agarose electrophoresis, a frequent sign of liver obstruction independent of pathogenesis, is caused by a defect in apo-LPA, whose binding potential for certain lipid fractions is diminished or abolished. The character of lecithin, cholesterol acyltransferase activity in liver disease, is paradigmatic.

6664 CURRENT CONCEPTS OF POSTOPERATIVE HEPATIC DYSFUNCTION. (Eng.) LaMont, J. T.; Isselbacher, K. J. (Peter Bent Brigham Hosp., Boston, MA). *Conn. Med.* 39(8):461-464; 1975.

The pathophysiologic consequences of surgery and anesthesia on hepatic function are reviewed, and the various clinical presentations of postoperative jaundice are described. Approximately one-third to one-half of surgical patients develop minor postoperative abnormalities of liver function, while significant jaundice (bilirubin, 2.5 mg%) occurs in 1% or less of patients. Although the exact pathophysiology of postoperative jaundice is unknown, a number of factors have been implicated, including hypotension, hypoxemia, sepsis, blood transfusion, and allergic or toxic reactions to drugs and anesthetic agents. Since most cases of postoperative jaundice are due to damage to the hepatocyte rather than extrahepatic biliary obstruction, surgery is rarely necessary.

6665 MAJOR HEPATIC VEIN LIGATION NECESSITATED BY BLUNT ABDOMINAL TRAUMA. (Eng.) DePinto, D. J.; Mucha, S. J.; Powers, P. C. (Naval Regional Medical Center, 17th and Pattison Ave., Philadelphia, PA 19145). *Ann. Surg.* 183(3):243-246; 1976.

An unusual case involving avulsion of the middle and left hepatic veins secondary to blunt trauma is presented. The patient, a 19-yr-old man, underwent exploratory laparotomy 4 hr after an automobile accident. An actively bleeding 6-cm laceration on the anterosuperior surface of the liver was found. Although several bleeding arterial branches were ligated, blood continued to accumulate. Massive hemorrhage, resulting from attempts to visualize the bleeding source, suggested retrohepatic vena cava and/or hepatic vein disruption. The porta hepatis was occluded and the bleeding was tamponaded. Median sternotomy was performed, and rapid transfusions into the retrohepatic vena cava via a chest catheter were performed. The diaphragm was split to the vena cava, and the tamponade was slowly removed. Blood loss was reduced, and completion of the traumatic hepatic fracture allowed exposure of the anterior surface of the retrohepatic vena cava. Avulsion of the middle and left hepatic veins necessitated their ligation. The defect in the vena cava was closed with a continuous suture. The intraluminal shunt was removed, and 90 min of intermittent porta hepatis occlusion was terminated. Immediately after the ligation of the middle and left hepatic veins, the left lobe became canotic; however, 15-30 min after restoration of the flow within the porta hepatis, the appearance of the parenchyma had improved, and left hepatectomy was unnecessary. The postoperative course was relatively uncomplicated, and the patient is asymptomatic 10 months after the injury. Although serial hepatic scans 10 days after surgery showed nonvisualization of the left lobe and poor uptake within the right lobe, scans done 24 and 50 days post injury demonstrated near normal perfusion of the right lobe and delayed and slightly decreased perfusion of the left lobe. Ten months after operation, the scan was normal except for a small wedge-shaped defect. This case demonstrates that if after ligating major hepatic veins, the condition of the obstructed parenchyma stabilizes or improves under direct observation and if the condition of the patient does not deteriorate, resection may not be required.

6666 GASTROJEJUNOSTOMY INHIBITS POSTSHUNT SIDEROSIS.

(Eng.) Doberneck, R. C.; Fischer, R.; Smith, D. (Sch. Medicine, Univ. New Mexico, 2211 Lomas Blvd., NE, Albuquerque, NM 87131). *Surgery* 78(3):334-338; 1975.

The mechanism for the development of hemosiderosis following portacaval shunt was investigated in 26 dogs. Thirteen of 14 dogs developed marked increases in hepatic hemosiderin after the construction of a portacaval shunt, whereas only 3/12 dogs developed such siderosis after the duodenum was excluded by the construction of a portacaval shunt and end-to-side gastrojejunostomy. The mean level of splenic hemosiderin (2.2 on a graded scale of 0-4, in which 4 represents the highest amount of hemosiderin) was increased markedly in dogs with portacaval shunt, but increased minimally in dogs with portacaval shunt and gastrojejunostomy (0.91; control level, 0.8). Rib marrow fat increased slightly in dogs with portacaval shunt (0.45; control, 0.38) and decreased slightly in dogs with portacaval shunt and gastrojejunostomy (0.32). Continued iron absorption appears to account for the development of postshunt siderosis, and the addition of gastrojejunostomy ameliorates postshunt siderosis by diminishing iron absorption.

6667 LIVER INJURY.

(Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 3(5983): 558; 1975.

A brief review of the mortality rate, treatment, and diagnosis of liver injury is presented. Since the 1960's, there has been a considerable improvement in survival after liver injury. Among 270 patients in one series, only 5 with stab wounds died, largely the result of wound infection and pulmonary atelectasis. The mortality from blunt liver injury has shown the most dramatic decrease—from 60% to 30% or less. Among the reasons for this improvement were the change from the packing of liver wounds to suture ligation of bleeding points, the employment of antibiotics, and appropriate drainage. These methods, together with debridement of devitalized liver tissue and occasional hepatic lobectomy for extensive shattering wounds, have been effective in the treatment of some injuries. Some authors have recently shown that hepatic arterial ligation, combined with debridement, is valuable in the treatment of some cases of major liver damage. Up to 30% of patients, especially those with blunt injury, may present without gross signs of intra-abdominal damage. Mortality and morbidity are related to delay in treatment, and laparotomy on suspicion of liver injury is justifiable. Special investigations (liver scan, selective celiac axis angiography, abdominal paracentesis, and peritoneal lavage) are not generally available and may give false-negative results. They may, however, be valuable in detecting the late-presenting intrahepatic hematoma, and they may detect damage before the need for laparotomy becomes evident on physical examination.

6668 ANTIBIOTIC CONCENTRATIONS IN HEPATIC INTERSTITIAL AND WOUND FLUID.

(Eng.) Waterman, N. G.; Raff, M. J.; Scharfenberger, L.; Barnwell, P. A. (Dept. Surgery, Price Inst., Louisville, KY). *Surg. Gynecol. Obstet.* 142(2):235-238; 1976.

Antibiotic concentrations in serum, bile, hepatic interstitial fluid, and interstitial fluid of the soft tissues of the abdominal wall were measured after the i.v. administration of cephalothin, cefazolin, ampicillin, tetracycline (all at 20 mg/kg), and gentamicin (1.1 mg/kg) to dogs. Cephalothin, cefazolin, ampicillin, and tetracycline appeared in the bile at concentrations greater than the simultaneous serum levels. Biliary cephalothin decreased from 75 mg/ml at 1 hr to 50 mg/ml at 4 hr. The 1- and 4-hr biliary levels of cefazolin were 400 mg/ml and 350 mg/ml, resp.; of ampicillin, 125 mg/ml and 75 mg/ml, resp.; and of tetracycline, 100 mg/ml and 150 mg/ml, resp. During the period from 1 to 4 hr after the administration of ampicillin or cefazolin, concentrations of these antibiotics in the serum and interstitial fluids of the soft tissue and liver were similar. The levels of tetracycline in the serum remained approximately twice those of the soft tissue and hepatic interstitial fluid over the same period. Tetracycline levels in these two interstitial fluids were not significantly different from each other at any time. Serum cephalothin levels decreased rapidly after 1 hr, becoming equivalent to the low hepatic interstitial fluid levels by 3 hr. Cefazolin concentrations in serum and both interstitial fluids were similar throughout the entire period of measurement, and the disappearance of cefazolin from these compartments occurred at a slower rate than with cephalothin. Serum gentamicin concentrations exceeded biliary levels only during the first 2 hr. There were no significant differences in the gentamicin levels between the two interstitial fluids at any time. The results suggest that the tendency of an antibiotic to concentrate in bile does not correlate with levels achieved in hepatic interstitial fluid or in wound exudates; the latter are closely similar to soft tissue fluids with respect to penetration by antimicrobial agents. The selection of an antimicrobial agent for the therapy of hepatic parenchymal infection or obstructive cholecystitis should, therefore, be based on susceptibilities of the suspected organism rather than on the relative tendencies of various agents to be concentrated in bile.

6669 DIFFUSE LIVER INJURY IN AMEBIC ABSCESS OF THE LIVER: AN ELECTRON MICROSCOPIC STUDY.

(Eng.) Tandon, B. N.; Tandon, H. D.; Ravi, V. V.; Gandhi, P. C. (All-India Inst. Medical Sci., New Delhi 110016, India). *Exp. Mol. Pathol.* 23(2): 155-163; 1975.

Liver biopsies of eight patients with amebic liver abscesses were studied by light and electron microscopy, to obtain evidence of diffuse parenchymal injury. In four patients, the studies were repeated on complete clinical recovery, after specific antiamebic treatment. Light microscopic changes were nonspecific and suggested diffuse parenchymal injury in some biopsy specimens. The ultrastructural changes in the hepatocytes were consistent in all patients; these included dilatation of endoplasmic reticulum, vesicle formation and fragmentation, reduction in microsomes, and mitochondrial abnormalities. Many cells showed features of regenerative activity. These changes are similar to those reported in patients with the nonsuppurative form of the disease, where the changes were less severe and suggestive of more active regeneration. The changes were reversed on treatment. These observations suggest that nonsuppurative hepatic amebiasis is a distinct pathologic entity, even though the light microscopic changes by themselves are not specific.

6670 SIGNIFICANCE OF SERUM LACTIC DEHYDROGENASE ENZYME IN HEPATIC AMOEBIASIS.

(Eng.) Mahajan, R. C.; Singh, K.; Ganguly, N. K.; Chitkara, N. L. (Postgraduate Inst. Medical Education Res., Chandigarh-160011, India). *Indian J. Med. Res.* 63 (7):1006-1009; 1975.

Because elevated levels of serum lactic dehydrogenase (LDH) have been observed in various diseases, the level of this enzyme was determined in the sera of 25 patients with proven amebic liver abscess, 50 healthy controls, 10 control patients with infectious hepatitis, 10 with noncirrhotic portal fibrosis, 5 with hepatoma, and 5 with myocardial infarction. In the sera from normal controls, the LDH level ranged between 40 and 230 mIU; levels of 240 mIU or more were considered elevated. Raised serum LDH, ranging from 266 to 948 mIU, occurred in 23 of the 25 patients with amebic liver abscess in the acute phase. The LDH level returned to normal in all but two patients at 1 month after the complete cure of the disease. Elevated LDH occurred in eight cases of infectious hepatitis in the control patients, three cases of noncirrhotic portal fibrosis, all cases of hepatoma, and in four cases of myocardial infarction. The results suggest that LDH determination may be a useful index for the cure of invasive hepatic amebiasis.

6671 AMOEBIC LIVER ABSCESS PRESENTING THIRTY-TWO YEARS AFTER ACUTE AMOEBIC DYSENTERY.

(Eng.) Jones, R. W. (Brompton Hosp., London SW3 6HP, England). *Proc. R. Soc. Med.* 68(9):593-594; 1975.

The case of a 50-yr-old man in whom an amebic liver abscess appeared 32 yr after an episode of amebic dysentery is presented. The patient presented with a 1-week history of rigors, fever, malaise, anorexia, and generalized aches and pains. The ESR was increased (125 mm/hr), and liver function tests were abnormal. He was treated initially with co-trimoxazole. When his history of amebic dysentery was discovered, a liver scan was performed. A single large space-occupying lesion was seen in the middle of the right lobe. After treatment for 5 days with metronidazole (400 mg, 3 times daily), the ESR fell to 15 mm/hr, the liver function tests returned to normal, and the appearance of the liver scan was improved. His symptoms reappeared, and the feces were found to contain numerous pus cells and some RBC, but no amebae or cysts. After 10 further days of treatment with metronidazole (800 mg, 3 times daily), there was clinical improvement. The author concludes that hepatic amebiasis should be considered as the differential diagnosis in patients who have been in the tropics, even without a past history of dysentery.

6672 HISTOPATHOLOGIC STUDY OF THE LIVER IN THE EARLY CHOLESTATIC PHASE OF ALPHA-1-ANTITRYPSIN DEFICIENCY.

(Eng.) Hadchouel, M.; Gautier, M. (U-56, INSERM, Hopital d'Enfants, Le Kremlin Bicetre, F 94270, France). *J. Pediatr.* 89(2):211-215; 1976.

Liver biopsies obtained during the first 6 months of life from 15 children who had prolonged neonatal cholestasis and alpha-1-antitrypsin deficiency were examined to predict the course of liver damage. The duration of follow-up ranged from 16 months to 19 yr. Liver tissue was obtained by percutaneous needle or by surgical biopsy. Intracellular PAS-positive globules were always observed, even during the first months of life. Their size ranged from 1 to 20 µ, and the number of globules in individual hepatocytes ranged from a single large globule to about 20 small ones. The globules were concentrated in periportal hepatocytes, even in the absence of cirrhosis. Abnormalities in liver cells included cytoplasmic vacuolization, nuclear inclusions, and necrosis. Three morphologic patterns of hepatic alteration were distinguished. The first consisted of six cases with cholestasis, hepatocellular damage, and slight portal fibrosis. The second group comprised five cases with important portal fibrosis and bile duct proliferation. Four cases in which ductular hypoplasia was the main feature formed the third group. A correlation between histologic patterns and clinical course was established. Improvement of liver injury was predicted for group 1, early cirrhosis for group 2, and prolonged cholestasis for group 3. The natural evolution of the alpha-1-antitrypsin deficiency appears to be different in each of the three groups.

6673 TREATMENT OF ASCITES BY REINFUSION OF CONCENTRATED PERITONEAL FLUID--REVIEW OF 318 PROCEDURES IN 210 PATIENTS.

(Eng.) Levy, V. G.; Pauleau, N.; Opolon, P.; Caroli, J. (Hopital St. Antoine, 184 rue du Faubourg, St. Antoine F75012, Paris, France). *Postgrad. Med. J.* 51(598):564-566; 1975.

The results from 210 patients in whom a modified plate dialyzer (Rhone-Poulenc) was used to concentrate ascites for reinfusion are reported. A total of 318 reinfusions were performed. In most cases, the patients had failed to respond to treatment with diuretics. The underlying pathology of the ascites was: alcoholic cirrhosis (155 cases), posthepatic cirrhosis (31), biliary cirrhosis (2), Budd-Chiari syndrome (7), abdominal tumors (7), pancreatitis (1), constrictive pericarditis (1), and miscellaneous (6). In 80 cases, the mean time in which ascites were reduced was 21 hr. The mean weight loss in these cases was 7.34 kg; decrease in abdominal girth, 10.6 cm; and volume of filtrate, 6,570 ml. In 60 cases, the mean increase in plasma volume during reinfusion was 471 ml, but this was transient and returned to basal levels within 10 days. Creatinine clearance also improved transiently from 44 ml/min to 73 ml/min, but usually fell to basal levels within 1 week. The urine volume doubled in 35% of the cases, but a significant natriuresis (>50 mEq/day) was achieved in only 24%. The plasma sodium concentration often fell 7 days after reinfusion. This could be prevented by giving a sodium load during reinfusion; 0.7 mEq/kg was needed to increase the plasma sodium concentration by 1 mEq/l. Of 37 patients with a plasma urea concentration greater than 80 mg/100 ml, only 11 had marked improvement in renal function after the procedure. Pyrexia occurred in 50% of the reinfusions, but disappeared soon afterwards. Pulmonary edema occurred in 12 cases, hemolytic jaundice in 2, and overt gastrointestinal hemorrhage in 11. Peritoneal infection occurred in 14 cases, and this was a major contributing factor to death in 5. The following laboratory changes occurred: decreased platelets (44 patients), decreased fibrinogen (34), decreased factor V (32), decreased factor II or VII + X (18), positive ethanol test (15), and positive Von Kaulla (<2 hr; 5 cases). Of 150 patients, 72 are still alive. The causes of death in the other 78 were liver failure (21), renal failure (21), hepatoma (7), and hemorrhage (15).

6674 CLINICAL EXPERIENCE WITH THE RHONE-POULENC ASCITES REINFUSION APPARATUS.

(Eng.) Arroyo, V.; Mas, A.; Vilardell, F. (Hosp. Clinico y Provincial, Univ. Barcelona, Barcelona, Spain). *Postgrad. Med. J.* 51(598):571-572; 1975.

Results with six patients with cirrhosis and ascites who were treated with the Rhone-Poulenc ascites reinfusion apparatus are presented. Three patients were discharged without ascites after this treatment. Of the remaining patients, one died of acute pulmonary edema, one died from a massive gastrointestinal hemorrhage due to the rupture of an esophageal varix, and the third died from an acute myocardial infarction. There was no differences between the patients who survived and those who died in relation to age, duration of the perfusion, or the amount of ultrafiltrate produced per hour. The infusion of concentrated ascitic fluid was followed by an increase in urine volume and natriuresis in all patients. There was a significant increase in heart rate and central venous pressure in all but one patient. One patient who had not responded to diuretics recovered following the treatment. This procedure could be valuable in the treatment of cirrhotic patients with ascites who cannot be managed by diuretic therapy.

6675 HEPATIC PORTOENTEROSTOMY: INDICATED OR NOT IN THE TREATMENT OF BILIARY ATRESIA?

(Eng.) Campbell, D. P. (Oklahoma Children's Memorial Hosp., P.O. Box 26901, Oklahoma City, OK 73190). *Am. J. Dis. Child.* 129(12):1427-1428; 1975.

Experience with hepatic portoenterostomy in the treatment of biliary atresia is reviewed and discussed. In Japan, the use of hepatic portoenterostomy in the surgical treatment of uncorrectable types of biliary atresia was first reported in 1957, and the cure rate was approximately 10%. More recent reports claim cure rates of 40-50%, using modifications of this procedure. The author has previously performed 13 such procedures, and only three patients have survived. These results cannot be compared with the favorable results reported by the Japanese investigators; it is believed that the Japanese were actually operating on infants with microscopic bile ducts present in the porta hepatis (a form of biliary hypoplasia). Serum lipoprotein-X (LP-X) determinations before and after a short course of cholestyramine resin enable infants with biliary hypoplasia to be eliminated from consideration for surgery; infants with true biliary atresia will show a progressive rise in the serum LP-X level, despite cholestyramine resin administration. Despite the poor results obtained with this procedure, hepatic portoenterostomy is recommended for all infants without grossly identifiable ducts in the porta hepatis; the operation may help if microscopic extrahepatic bile ducts are present. If an infant is to benefit from this procedure, it must be performed before 3 months of age.

6676 BILE ACID METABOLISM IN CHOLESTASIS.

(Ger.) Back, P. (Med. Univ.-Klinik, Freiburg, W. Germany). *Verh. Dtsch. Ges. Inn. Med.* 80: 415-418; 1974.

Some problems in the relation of bile acids to cholestasis (CH) are reviewed. In human CH syndrome, glucuronide formation and sulfate esterification are more effectively prophylactic against possible toxic effects of bile acids than hydroxylation mechanisms. Introduction of a sulfate ester group elicits a 2.4-2.9% greater renal clearance than glycine or taurine conjugates. The effect of differential hydroxylation in the conjugated group is not significant, but in the group of sulfate ester derivatives, it is highly significant ($p<0.001$) between 3β-hydroxy-5-cholenic and cholic acids. No difference obtains between the clearance of sulfate esters of 3β-hydroxy-5-cholenic acid and conjugated bile acids, which suggests that the delay time of this compound is also prolonged in CH. In one case of chronic intrahepatic CH that was refractory to therapy for 2 yr, phenobarbital administration elicited increased formation of cholic glucuronide, which probably represents the effective therapeutic mechanism. CH, neonatal CH, benign and recurrent pediatric CH, the CH of pregnancy and oral contraception, and primary gynecological biliary cirrhosis are all probably expressions of deficient bile acid glucuronidation. This is related to the appearence of atypical, planar bile acids in urine and plasma.

6677 DIFFERENTIAL DIAGNOSIS AND FOLLOW-UP STUDIES IN NEONATES AND INFANTS WITH PERSISTENT CHOLESTASIS. (Ger.) Gathmann, H. A.; Osswald, P.; Muller, G. (Pathologisches Institut, Universitat Erlangen-Nurnberg, D-8520 Erlangen, Krankenhausstrasse 8-10, W. Germany). *Z. Kinderheilkd.* 120(4): 259-276; 1975.

Liver histopathology is reviewed and discussed from differential diagnostic and prognostic perspectives in the long-term management of pediatric cholestases (CHT). Intrahepatic CHT with intrahepatic hypoplasia (11 cases), CHT with overproliferation of intrahepatic ductal segments and intact extrahepatic ducts (1 case), CHT with occluded extrahepatic ducts and intrahepatic ductal proliferation (14 cases), extrahepatic occlusion with intrahepatic hypoplasia (4 cases), intrahepatic CHT with primary inflammation with (10 cases) or without (13 cases) giant cells, and idiopathic intrahepatic CHT (9 cases) comprise the pathogenetic taxonomy of ductal dysplasia. The basic criteria were bile pigment localization, presence of inter- or intralobular duct type, hepatocyte modification, giant cell formation, necrosis, fibrosis, and inflammatory infiltration of portal fields. The question of distinguishing between primary inflammation and congenital malformation is discussed.

6678 CYSTIC DILATION OF THE INTRAHEPATIC BILE DUCTS. (Eng.) Faerber, E. N.; Couper-Smith, J.; Solomon, A. (Baragwanath Hosp., Johannesburg, South Africa). *S. Afr. Med. J.* 49 (32):1303-1304; 1975.

The cases of two black patients with cystic dilatation of the intrahepatic biliary tree are presented. Neither patient had gallstones. In the first patient, a 35-yr-old woman, the serum bilirubin was less than 1.0 mg/100 ml. The second patient, a 68-yr-old woman, had a serum bilirubin level of 8.0 mg/100 ml, mild derangement of liver function, and a palpable liver. The bilirubin level decreased to 1.6 mg/100 ml after she was discharged. The cystic dilatation was detected in both patients by i.v. cholangiography.

6679 THE CLINICAL PICTURE OF ARTERIOHEPATIC DYSPLASIA. (Ger.) Oldigs, H. D.; Muller-Wiefel, D.-E. (Abtlg. Allgem. Padiatrie, Zentrum Kons. Med. II der Universitat, Frobelstr. 15-17, D-2300 Kiel, W. Germany). *Monatsschr. Kinderheilkd.* 124(5):382-383; 1976.

The case history of "arteriohepatic dysplasia" in a 4-yr-old girl is described, and the significance of the syndrome in the differential diagnosis of neonatal cholestasis is discussed. Early postnatal icterus, weight loss, holosystolic noise, moderately elevated SGOT and SGPT, high gamma-glutamyl transpeptidase, and increased direct and total bilirubin comprised the abnormal profile. Exploratory laparotomy found an unremarkable gallbladder and cystic duct, but a hypoplastic ductus hepaticus and ductus choledochus. Intrahepatic bile ducts with cholestasis were confirmed histologically. Biopsy at 8 months found ductule proliferation as an expression of partial extrahepatic bile duct malformation. At 3.5 yr, bile duct hypoplasia and pulmonary artery hypoplasia and stenosis were marked. Enostosis of the left proximal femur was the only skeletal anomaly. The child's weight, height, and intelligence quotient were subnormal. A sibling had died at 3 months with extra- and intrahepatic ductal atresia; two other siblings are normal. This is the first report of arteriohepatic dysplastic syndrome in the German literature.

6680 MARKED ENLARGEMENT OF THE LEFT LOBE OF THE LIVER CAUSING A FALSE-POSITIVE SPLEEN IMAGE. (Eng.) Chaudhuri, T. K.; Bobbitt, J. V. (Veterans Admin. Center, Hampton, VA 23667). *Radiology* 119(1):169-170; 1976.

Experience with 10 patients with markedly enlarged left liver lobes whose posterior (prone) views (^{99m}Tc-sulfur colloid) revealed false-positive splenic defects are reviewed. In one case, the defect was also apparent in the anterior view. In all but one case, this pseudodefect was not present in the posterior image obtained standing up. In this patient, both a ^{131}I-rose bengal liver image and a ^{51}Cr-RBC (heat-denatured) spleen image were obtained for correct interpretation of the splenic defect. The spleen was normal, and the area of uptake above the spleen was a result of the horizontally enlarged left liver lobe. The authors caution against diagnosis from an apparently abnormal posterior image, unless proved by other measures.

6681 THE CYTOTOXICITY OF PLASMA FROM PATIENTS WITH ACUTE HEPATIC FAILURE TO ISOLATED RABBIT HEPATOCYTES. (Eng.) Hughes, R. D.; Cochrane, A. M. G.; Thomson, A. D.; Murray-Lyon, I. M.; Williams, R. (King's Coll. Hosp. Medical Sch., Denmark Hill, London, SE5 England). *Br. J. Exp. Pathol.* 57(3):348-353; 1976.

The cytotoxicity of plasma from patients with acute hepatic failure and the effects of charcoal hemoperfusion on it were studied in cultured hepatocytes from New Zealand white rabbits. Peripheral venous blood was taken from 18 normal subjects, 20 patients with chronic active hepatitis, 13 with extrahepatic biliary obstruction, and 10 with uncomplicated viral hepatitis. Arterial blood samples were taken from 6 patients without liver disease and from 14 patients with fulminant hepatic failure (FHF) undergoing charcoal hemoperfusion treatment. Plasma was separated from the samples, diluted, and one drop of each was added to microculture plates containing the rabbit hepatocytes. There was no significant difference in values for arterial samples from the patients without liver disease and venous samples from the normal controls. The highest cytotoxicity values were from patients with FHF (34 ± 7.56%), followed by viral hepatitis (16 ± 4.25%). Both values were significantly greater than those of control subjects ($p<0.005$ and $p<0.05$, resp.).

Cytotoxicity of plasma from obstructive jaundice and chronic active hepatitis patients did not differ significantly from control values. In the FHF patients treated by charcoal hemoperfusion, the cytotoxicity of arterial samples was significantly higher ($p<0.02$) than that of the venous samples. By heating the samples, a significant reduction in cytotoxicity in both the FHF and viral hepatitis patients occurred. The cytotoxicity of plasma from six FHF patients showed no significant difference before and after millipore filtration. When plasma from two of these patients was dialyzed against buffer, cytotoxicity decreased from 51% to 4% and from 65% to 21%, resp. The addition of a variety of substances to plasma, including bile acids and bilirubin, enhanced cytotoxicity, but only to a significant degree with lithocholic and chenodeoxycholic acids (44%, $p<0.005$ and 54%, $p<0.001$, resp.). The results suggest that the cytotoxicity in patients with liver disease may be related to substances found in the plasma during liver necrosis, and that bilirubin is not implicated.

6682 CHOLANGITIS COMPLICATING CONGENITAL HEPATIC FIBROSIS.

(Eng.) Howlett, S. A.; Shulman, S. T.; Ayoub, E. M.; Alexander, R. A.; Donnelly, W. H.; Cerda, J. J. (Univ. Florida Coll. Medicine, Gainesville, FL 32610). *Am. J. Dig. Dis.* 20(8):790-795; 1975.

The case of a 5.5-month-old girl who survived cholangitis complicating congenital hepatic fibrosis is presented. The patient was hospitalized with a 16-day history of fever. The liver and spleen were palpable. At exploratory laparotomy, the liver was diffusely mottled, with a whitish reticular appearance. No evidence of collateral portal venous circulation was seen, and the spleen appeared normal. Operative wedge and needle liver biopsies confirmed the diagnosis of congenital hepatic fibrosis and acute suppurative cholangitis. Polymorphonuclear leukocytes were seen around and within the bile ducts and had infiltrated the bile duct endothelium. Although bacteria were observed within these leukocytes by electron microscopy, the surgical specimen was not cultured. *Klebsiella aerogenes* was isolated from the blood cultures. The patient remained afebrile during a 2-week course of i.v. gentamycin. Subsequently, the fever recurred in spite of p.o. cephalexin. Because of persistent anemia, she was transfused with 75 ml of packed RBC in preparation for a percutaneous needle-liver biopsy, which was performed immediately afterward. The liver biopsy was unchanged, and cultures of the homogenate grew *K. aerogenes*. The patient rapidly became afebrile without antibiotic therapy. She has had no signs of infection for the past 12 months, although hepatomegaly persists. The recovery of the patient at a time when she was febrile, had positive cultures, but was not on antibiotics could be due to the spontaneous resolution of a partial intrahepatic biliary obstruction, a response to the blood transfusion, or to the possibility that the febrile illness was unrelated to the positive liver biopsy culture. These possibilities all suggest that a conservative approach to this situation be considered.

6683 CHOLANGIOCARCINOMA ARISING IN CONGENITAL HEPATIC FIBROSIS: A CASE REPORT.

(Eng.) Daroca, P. J., Jr.; Tuthill, R.; Reed, R. J. (Tulane Univ. Sch. Medicine, 1430 Tulane Ave., New Orleans, LA 70112). *Arch. Pathol.* 99(11):592-595; 1975.

The case of a patient with cholangiocarcinoma arising in congenital hepatic fibrosis is presented, together with the gross necropsy findings and the histologic findings in biopsy and autopsy specimens. The patient, a 62-yr-old woman, presented with progressive weakness, weight loss, pain in the right shoulder and back, and cough. Twenty years previously, a cholecystectomy and liver biopsy had been performed after a diagnosis of chronic cholecystitis had been made. Abnormal laboratory values included the following: serum alkaline phosphatase (115 mU/ml), serum bilirubin (1.2 mg/100 ml), and serum albumin (2.4 g/100 ml). An x-ray series disclosed esophageal varices, and a ^{49m}Tc sulfur colloid liver scan was interpreted as an abnormal pattern, indicative of cirrhosis with portal hypertension. The patient died after a period of acute distress and diaphoresis. At autopsy, signs of portal hypertension, congestive splenomegaly (600 g), and hepatomegaly (1,600 g) were observed). The cut surface of the liver showed irregular, glistening fibrous trabeculae. An irregularly outlined, gray-white tumor measuring 5 cm in diameter was present within the right lobe of the liver near the porta hepatis. Metastatic tumor was present in both adrenal glands, in lymph nodes of the porta hepatis, and in both lungs. Tumor nodules were found on the cortical surface of the kidney and the apical interventricular septum. Sections of the liver from the biopsy and autopsy specimens were similar, except for more extensive fibrosis on the latter. Microscopically, the portal trabeculae were characterized by hyperplasia and distortion of bile ductules. Some of the ductules contained inspissated bile thrombi. In many areas, the bile ductules extended from the portal trabeculae through the periportal limiting plate, entered the periphery of the hepatic lobule, and appeared to become contiguous with liver cell cords. The pattern of the neoplasm was that of an adenocarcinoma of bile duct origin, but it varied in the degree of differentiation. In some areas, it was well differentiated, mimicking the "picket fence" character of bile duct epithelium. In other areas, the tumor was poorly differentiated, assuming the pattern of a giant cell carcinoma.

6684 INCREASED SERUM URATE IN GALACTOSEMIA PATIENTS AFTER A GALACTOSE LOAD: A POSSIBLE ROLE OF NUCLEOTIDE DEFICIENCY IN GALACTOSEMIC LIVER INJURY.

(Eng.) Forster, J.; Schuchmann, L.; Hans, Ch.; Niederhoff, H.; Kunzer, W.; Keppler, D. (Biochemisches Institut der Universitat, D-7800 Freiburg i. Brsg., Hermann-Herder-Str. 7, W. Germany). *Klin. Wochenschr.* 53(24):1169-1170; 1975.

The effects of a p.o. load of galactose under standardized conditions were studied in five galactosemic and five normal children. The maximal blood galactose level after 1.5 hr was 12.6 ± 2.0 mM in children with a deficiency of uridylyl transferase and 5.8 ± 1.2 mM in the controls. The concentration of serum urate in galactosemics increased to 155% of the fasting level ($p<0.005$); no rise was detectable in the controls. The elimination of urate with the urine was augmented by the same amount in both groups. These studies provide evidence for an increased catabolism of hepatic nucleotides, which may lead to a deficiency of nucleotides, has been proposed as a cause of galactosemic liver injury.

6685 CONTINUOUS NOCTURNAL INTRAGASTRIC FEEDING FOR MANAGEMENT OF TYPE I GLYCOGEN-STORAGE DISEASE.

(Eng.) Greene, H. L.; Slonim, A. E.; O'Neill, J. A., Jr.; Burr, I. M. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37203). *N. Engl. J. Med.* 294(8):423-425; 1976.

A study was carried out to determine whether continuous nocturnal intragastric feeding, combined with frequent daytime feedings, would represent a practical long-term medical alternative to portacaval shunting in patients with type 1 glycogen-storage disease. In addition, the efficacy of using clofibrate as an adjunct to such therapy was investigated. Three patients with type 1 disease were treated with intragastric infusions of a high glucose formula at night and 3-hr starch feedings during the day. This regimen stabilized blood glucose levels above 70 mg per deciliter and decreased serum uric acid, triglyceride, lactate and serum oxalacetic transaminase levels, as well as hepatic size, in all patients. Increased linear growth rate (mean of 1 cm/month) was associated with a decrease in mean plasma glucagon (from 190 to 40 pg/ml) and an increase in mean plasma insulin [from 19 to 43 μU/ml, (two patients)]. These changes occurred within 4 weeks of treatment and continued with home treatment for 13 months. No complications resulted from tube placement daily by the patients. One patient received clofibrate (50 mg/kg) daily in two divided doses. The metabolic responses in this patient were similar to those obtained during nocturnal feeding, with the exception that blood glucose levels were lower (80 mg/dl during treatment with clofibrate and 99 mg/dl during treatment with nocturnal infusions). In the other two patients, the blood glucose levels were 96-111 mg/dl. The results indicate that type 1 disease can be managed by nighttime intragastric feeding and frequent daytime high starch meals.

6686 PELIOSIS HEPATIS IN AN INFANT.

(Eng.) Nuernberger, S. P.; Ramos, C. V. (St. Louis Univ. Sch. Medicine, 1402 S. Grand St., St. Louis, MO 63104). *J. Pediatr.* 87(3):424-426; 1975.

The case of a 15-month-old girl with peliosis hepatis is presented. The child had a 2-day history of vomiting and fever. The liver edge was tender and located 5 cm below the right costal margin. The patient died 18 hr after hospitalization. The postmortem findings included 750 ml of serosanguineous fluid within the thoracic cavity, bilateral pulmonary congestion, focally ulcerated bladder mucosa, and a friable liver with a nodular gray-brown mottled surface. Histologically, the liver contained multiple vascular lakes, without evidence of a fibrous or endothelial lining, red cell margination, or thrombi. These vascular lakes were located throughout the lobules and did not usually communicate with the central veins. Kidney sections revealed evidence of early pyelonephritis. This patient appears to be the youngest recorded case of peliosis hepatis.

6687 CHOLESTEROL POLYCORIA IN THE ADULT: CLINICAL AND HISTOCHEMICAL ASPECTS.

(Fre.) Lageron, A.; Lichtenstein, H.; Bodin, F.; Conte, M. (U9, INSERM, Hopital Saint-Antoine, 75012 Paris, France). *Med. Chir. Dig.* 4(1):9-14; 1975.

A case is reported of cholesterol ester storage disease (cholesterol polycoria) in a 45-yr-old woman. The clinical picture was dominated by hepatomegaly. The liver was extremely large, firm to palpation, and laparoscopy revealed a homogeneous, slightly granulated surface of a "butter yellow" color. The hepatomegaly was accompanied by signs of portal hypertension including radiologically evident esophageal varices. Hepatic scintigraphy with ^{198}Au showed homogeneous distribution of the isotope with hypofixation at the junction of the right and left lobes. No anomalies of arteries or veins were observed on arteriography. The only abnormal value obtained in a complete liver function study was serum hyperlipemia (total lipids were 13 g/l; cholesterol was 3 g/l). Radiological examination of the biliary tract and all other examinations were negative. The hyperlipemia did not respond to treatment with cholestyramine. The disease had a very long evolution, 36 yr, during that time the patient was hospitalized on several occasions for a pseudo-angiocholitis. The genetic character of the disorder is indicated by the presence of the symptoms in the patient's 20-yr-old son. The case is the sixth reported in the literature. Final diagnosis of the disorder depends on the spongy appearance of the hepatocytes due to the presence of an excess of esterified cholesterol.

6688 REYE'S SYNDROME WITHOUT FATTY LIVER.

(Eng.) Gosseye, S.; De Meyer, R.; Maldague, P. (Clinique Universitaires Saint-Raphael, Capucijnenvoer 35, 3000 Leuven, Belgium). *Helv. Paediatr. Acta* 30(6):509-513; 1975.

The case of a 2.5-yr-old boy who developed a fatal case of Reye's syndrome without fatty liver is presented. The patient was hospitalized with symptoms typical of Reye's syndrome, i.e., vomiting, fever, coma, and hyperammonemia (360 μg/100 ml). The patient was also slightly icteric, and the total bilirubin level was 5.35 mg/100 ml. The liver was palpable. Despite treatment with glucose, electrolyte, and bicarbonate perfusions, the blood ammonia level rose to 753 μg/100 ml. Temporary improvement occurred after an exchange transfusion, but the patient again became comatose and died from cardiac arrest. The postmortem examination revealed that the liver was grossly normal, except for congestion. Sections stained with Oil Red O showed only tiny fat droplets, loosely scattered in the liver cells. It appears that the classical, massive, and diffuse fatty degeneration of the liver is not an essential feature of Reye's syndrome.

6689 INTRAHEPATIC STONES. (Eng.) Mosavy, S. H.; Saghafi, M. R.; Moinedin, Kh. (No affiliation given). *Abdom. Surg.* 17(10):223-224; 1975.

The cases of two patients with intrahepatic stones are presented. The first patient, a 53-yr-old woman, presented with icterus, hepatosplenomegaly, and upper right quadrant pain. Twenty-four hours after hospitalization, she developed massive hemorrhage from esophageal varices and died. At autopsy, the liver was congested and enlarged (1,400 g) and contained intrahepatic stones ranging from 2 to 5 cm in diameter. The gallbladder was 6 x 4 x 2 cm and contained 10 ml of concentrated bile. The stones had caused biliary cirrhosis. The second patient, a 40-yr-old woman with a history of cholecystitis, presented with abdominal pain, vomiting, and a palpable liver. I.v. cholangiograms showed dilatation of the common bile duct and right hepatic duct. Some radiopaque shadows were interpreted as intrahepatic stones. This was confirmed at surgery, and three stones were removed by transhepatic lithotomy. The gallbladder was normal, but two stones were removed from the common bile duct. In both cases, the diagnostic procedure of choice for intrahepatic stones is percutaneous transhepatic cholangiography.

6690 STUDIES RELATIVE TO THE RADIOSENSITIVITY OF MAN: BASED ON RETROSPECTIVE EVALUATIONS OF THERAPEUTIC AND ACCIDENTAL TOTAL-BODY IRRADIATION. (Eng.) Ricks, R. C.; Lushbaugh, C. C. (Oak Ridge Associated Univ., TN). 226 pp.; 1975 [available through National Technical Information Services, Washington, DC; Document No. N75-32733/8WJ].

6691 ANGIOHEPATOTOMOGRAPHIC EXPLORATION OF MALIGNANT GROWTH OF THE LIVER. (Fre.) Lamarque, J.-L.; Bruel, J.-M.; Senac, J.-P.; de Sars, P.; Toulza, A. (Cliniques Saint-Eloi, CHU, 34059 Montpellier Cedex, France). *Ann. Gastroenterol. Hepatol. (Paris)* 12(2):141-152; 1976.

6692 TREATMENT OF PRIMARY EPITHELIAL GROWTHS OF THE LIVER. (Fre.) Couinaud, C. (Hopital Saint-Louis, 2, place du Docteur A.-Fournier, 75475 Paris Cedex 10, France). *Ann. Gastroenterol. Hepatol.* 12(3):215-223; 1976.

6693 RADIOLOGIC DIAGNOSIS OF METASTASES IN THE LIVER. (Ger.) Bublitz, G. (Zentralinst. fur Rontgendiagnostik Stadt. Krankenhaus, 3300 Braunschweig, W. Germany). *Roentgenblaetter* 28(9): 406-412; 1975.

6694 TWO NEW CASES OF NONMETASTATIC LIVER DISEASE COMPLICATING HYPERNEPHROMA. (Fre.) Pirson, Y.; Descos, L.; Mestrallet, G.; Saubier, E.; Houart, M.; Levrat, M. (Hopital Edouard Herriot, 3, place d'Arsonval, 69374 Lyon Cedex 2, France). *Ann. Gastroenterol. Hepatol.* 12(3):177-183; 1976.

6695 EVENTUAL ACTION OF THE MORPHOLOGY OF PORTAL BIFURCATION FOR ORIENTATION AND LOCALIZATION OF INTRAHEPATIC CANCEROUS CYTHEMIA. STUDY OF HEPATIC METASTASES OF COLORECTAL CANCERS. (Fre.) Marchal, G.; Clauss, B.; Bornemann, R. (Service de Chirurgie generale C, Cliniques Saint-Eloi, CHU, 34059 Montpellier Cedex, France). *Ann. Gastroenterol. Hepatol.* 12(3):189-201; 1976.

6696 BIOPSY AND CYTOLOGY BY LAPAROSCOPY IN PRIMARY AND SECONDARY CANCERS OF THE LIVER. (Fre.) Delavierre, P.; Martignon, Cl. (Hopital de Vaugirard, 389, rue de Vaugirard, 75015 Paris, France). *Ann. Gastroenterol. Hepatol.* 11(6):475-484; 1975.

6697 REPORT OF THREE CASES OF SURGICALLY TREATED HEPATIC HAMARTOMA. (Fre.) Saubier, E.; Brette, R.; Partensky, C.; Jeanblanc, F.; Lagoutte, J. (Hopital E.-Herriot, place d'Arsonval, F 69374 Lyon Cedex 2, France). *Arch. Fr. Mal. App. Dig.* 64(8):715; 1975.

6698 CRITERIA FOR THE INTENSIVE MANAGEMENT OF HEPATIC COMA. (Ita.) Ruffo, A.; Motta, F. (Istituto di Patologia Speciale Chirurgica, Universita degli Studi, Genova, Italy). *Minerva Med.* 67(14):861-879; 1976.

6699 CYSTIC DILATATION OF THE EXTRAHEPATIC AND INTRAHEPATIC BILE DUCTS WITH PORTAL HYPERTENSION AND MULTIPLE RENAL CYSTS. (Fre.) Nusinovici, V.; Chermet, J.; Levy, V. G.; Darnis, F. (Hopital Saint-Antoine, Paris, France). *Med. Chir. Dig.* 5(1):15-18; 1976.

6700 HEPATOLENTICULAR DEGENERATION AND PREGNANCY. (Por.) Tsuzuki, E.; Scaff, M.; Roitman, I.; Neme, B.; Canelas, H. M. (Hosp. das Clinicas da Fac. Med., Univ. de Sao Paulo, Sao Paulo, Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 31(1):35-38; 1976.

6701 ARTERIOGRAPHIC APPEARANCE OF CHOLESTATIC HEPATITIS ASSOCIATED WITH CHRONIC VOLVULUS OF THE SMALL INTESTINE AROUND THE MESENTERY IN AN ADULT. (Fre.) Pedinielli, L.; Marinetti, C.; Agin, P. (Hospitalier de Toulon, Toulon Cedex, France). *J. Radiol. Electrol. Med. Nucl.* 57(2):159-164; 1976.

6702 FEBRILE POSTOPERATIVE ICTERUS IN NONBILIARY ABDOMINAL SURGERY: THE DIAGNOSTIC AND THERAPEUTIC PROBLEMS OF 8 CASES. (Fre.) Colin, R.; Jourdan, J.; Boennec; Nicot, H.; Lepage, B.; Linon, M.; Grasser (Clinique chirurgicale A, C.H.U., St-Eloi, Montpellier, France). *Chirurgie* 101(12):943-950; 1975.

6703 PROGRESSION OF HEPATIC SEQUESTRUM FOLLOWING MECHANICAL INJURY. (Spa.) Torterolo, E.; Piacenza, G.; Bueno, G. P. M.; Bergalli, L.; Goller, W.; Traibel, J.; Cardeza, H.; De Vecchi, J.; Perrier, J. P. (Gral. Baldomir 2437, Montevideo, Uruguay). *Cir. Urug.* 45(3):185-188; 1975.

6704 THE COURSE OF WILSON'S DISEASE IN THE LIVER. (Ger.) Bachmann, H.; Willgerodt, H.; Eichner, B. (Neurologische Klinik der Karl-Marx-Universitat, 7039 Leipzig, Karl-Marx-Stadter-Str. 50, E. Germany). *Dtsch. Gesundheitswes.* 31(14):649-653; 1976.

6705 PRIMARY DIFFUSE INTRAHEPATIC LITHIASIS. REPORT OF A CASE. (Fre.) Molas, G.; Charpentier-Arnavon, P.; Potet, F. (Hopital Beaujon, 100, boulevard du General-Leclerc, Clichy, France). *Arch. Fr. Mal. App. Dig.* 65(2):145-153; 1976.

6706 A RARE, COMPLEX LIVER MALFORMATION. (Ita.) Pasqualitti, P.; Nuti, R.; Panichi, S. (Spedali Riuniti "Santa Maria Maddalena" di Volterra, Pisa, Italy). *Radiol. Med. (Torino)* 61(4):309-313; 1975.

6707 X-RAY DIAGNOSIS OF HEPATIC RUPTURE IN A NEWBORN. (Ger.) Keuth, U.; Althaus, W.; Feldmann, E. M. (Landeskinderklinik, D-668 Neunkirchen-Kohlhof/Saar, W. Germany). *Mschr. Kinderheilk.* 124(1):38-40; 1976.

6708 EVALUATION OF LIVER FUNCTION IN MITRAL STENOSIS. (Pol.) Mysik, M. (Klinika Wad Serca Instytutu Medycyny Wewnetrznej AM, Krakow, Poland). *Folia Med. Cracov.* 17(2):107-123; 1975.

See also, 6293, 6295, 6309, 6310, 6316, 6317, 6318, 6321, 6340, 6354, 6355, 6356, 6357, 6358, 6359, 6362, 6368, 6370, 6371, 6379, 6382, 6441, 6489, 6727, 6801, 6814, 6831, 6839, 6862, 6871, 6876, 6877, 6896.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

6709 HISTOENZYMOLOGICAL, HISTOCHEMICAL, AND ULTRASTRUCTURAL STUDY OF A CASE OF DUBIN-JOHNSON SYNDROME. (Fre.) Chamlian, A.; Casanova, P.; Remacle, J.-P.; Mathieu, B.; Laffargue, P. (Centre Hospitalier Universitaire Timone, chemin de l'Armee-d'Afrique, 13385 Marseille Cedex 4, France). *Arch. Anat. Pathol.* 24(1):7-12; 1976

The case of a 48-yr-old woman with Dubin-Johnson syndrome (chronic idiopathic jaundice) is reported. Histoenzymological and ultrastructural studies of the liver showed pigment granulations made up of lipomelamines accumulated in the lysosomes. Acid hydrolase (acid phosphatase, beta-glucuronidase, and sulfatase) enzymatic activities of the granules were most apparent in the pericentrolobular hepatocytes and suggested the existence of a hepatic deconjugation process. The lobular distribution of the mitochondrial dehydrogenases was not modified. However, glucose-6-phosphatase dehydrogenase was very low in all cells of the hepatic lobule. As previously reported in the literature, there were no specific enzymatic anomalies at the level of the hepatocytes or of the bile ducts, and thus, it is impossible to determine the mechanism of the excretory disorder or that of the pigment retention in the lysosomes.

6710 CLINICAL EXPERIENCE WITH THE USE OF PHENOBARBITAL FOR HYPERBILIRUBINEMIA PROPHYLAXIS IN FULL-TERM BABIES. A CONTROLLED STUDY. (Ger.) Schambach, K.; Menzel, K. (Kinderklinik, Medizinische Akademie, 50 Erfurt, Am Schwemmbach 32a, E. Germany). *Z. Aerztl. Fortbild. (Jena)* 69(10):535-537; 1975.

The effectiveness of phenobarbital as an enzyme inducer in hyperbilirubinemia prophylaxis was tested in 958 alternately treated, clinically healthy, term neonates without blood group incompatibility. The infants received the equivalent of 5 or 10 mg/kg/day phenobarbital on postnatal days 1-3, and the serum bilirubin was assayed spectrophotometrically on day 4. Serum bilirubin decreased from a median of 5.00 mg/100 ml in the control group (154 infants) to 4.52 mg/100 ml in the 5-mg group (161 infants). Serum bilirubin decreased with the 10-mg dose infants from 5.02 mg/100 ml in the controls (314 infants) to 4.03 mg/100 ml in the experimental group (329 infants), $p<0.01$. The frequency distribution found most of the serum bilirubin levels in all groups clustered between 2 mg/100 ml and 9.9 mg/100 ml. Values above 12 mg/100 ml confirmed the clinical role of phenobarbital. A serum bilirubin level of 15 mg/100 ml was found in 11 untreated cases, all of which required exchange transfusions for hyperbilirubinemia, while serum bilirubin levels were effectively controlled by 10 mg/kg phenobarbital in all cases. The strongest phenobarbital effect occurred in infants with a birth weight over 3,000 g, a gestation age of 40 or more weeks, and ABO- and Rh-congruent blood group patterns. Side effects were confined to slight sedation after 10 mg/kg phenobarbital. With a high risk of bilirubin encephalopathy, phenobarbital is the management of choice.

6711 HL-A ANTIGENS IN GILBERT'S SYNDROME [Abstract]. (Eng.) Penner, E.; Mayr, W. R.; Pacher, M.; Djawan, S.; Seyfried, H.; Djawan, O. (Ordinariat fur Gastroenterologie, Univ. Wien, Vienna, Austria). *Digestion* 12(4/6):337; 1975.

6712 CRIGLER-NAJJAR TYPE 2. A MORPHOLOGICAL AND FUNCTIONAL STUDY UNDER TREATMENT WITH MICROSOMAL ENZYME INDUCERS [Abstract]. (Eng.) Koch, M.; Freddara, U.; Lorenzini, I.; Capurso, L.; Galeazzi, G.; Jezequel, A. M.; Orlandi, F. (Digestive Diseases and Cell Pharmacology Units, Univ. Ancona, Ancona, Italy). *Digestion* 12(4/6):320; 1975.

See also, 6817.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

6713 LIVER CHANGES IN BURNS, AS SEEN IN THE CLINICAL MORPHOLOGIC PICTURE. (Eng.) Chlumsky, J.; Dobias, J.; Vrabec, R.; Marecek, B.; Chlumska, A.; Matejicek, V. (Medical Faculty Hygiene, Charles Univ., Prague, Czechoslovakia). *Acta Hepatogastroenterol. (Stuttg.)* 23(2):118-124; 1976.

Changes observed in the livers of 30 patients who survived severe burns are reported. In the shock period (immediately after the injury), serum transaminases were elevated in only two patients. Histologically, the Kupffer's cells were slightly activated, there were enlarged hepatocyte nuclei, and focal steatosis was present. SGOT and SGPT levels were increased (up to 170 mU/ml and 210 mU/ml, resp.) during the septic stage (from the end of the first week). The serum bilirubin level was also slightly higher (to a maximum of 5 mg%). At this time, the liver was slightly enlarged and sensitive. Light microscopy revealed focal steatosis in the hepatocytes, and the extent was directly proportional to the duration of sepsis. Focal necrosis was noted in two cases. Hepatic tissues were examined by electron microscopy in 15 cases at various intervals (1 month to 3 yr after the injury). At 1-8 months, the smooth endoplasmic reticulum was focally dilated, and glycogen was absent or present in reduced amounts. The microvillous surfaces of hepatocytes showed regressive changes. Bile retention within the hepatocytes was common. A striking feature in the livers of patients requiring prolonged treatment was that the smooth endoplasmic reticulum remained widened and increased, even in samples taken long after injury. Hepatocytes with two nuclei were often present. Regressive changes in the Kupffer's cells were found at all stages. There was no direct relation between the liver changes and the patients' ages, either during the shock period or the septic period.

6714 JAUNDICE AFTER APRINDINE. A HEPATITIS-LIKE HEPATIC DAMAGE. (Ger.) Brandes, J.-W.; Schmitz-Moormann, P.; Lehmann, F.-G.; Martini, G. A. (Medizinische Universitatsklinik, 3550 Marburg, Munnkopffstr. 1, W. Germany). *Dtsch. Med. Wochenschr.* 101(4):111-113; 1976.

The case history of hepatotoxic sequelae in a 50-yr-old woman under aprindine (APR) management for cardiac arrhythmia is reported. After a 7-yr history of procainamide and digitalis for arrhythmia and Briserin for hypertension, the patient was switched to APR. Nausea, anorexia, headache, constipation, and pressure sensation in the right hypochondriac region set in 8 days later. Within 2 weeks, findings of elevated serum transaminases, alkaline phosphatase, and bilirubin suggested viral hepatitis, although B-antigen was not demonstrable. Leucine aminopeptidase, gamma-glutamyl transpeptidase, LDH, serum amylase, and urinary amylase were also increased. All other paraclinical findings were negative, including the absence of eosinophilia. Concurrent liver histology found dilated portal fields, Councilman's bodies in the parenchyma, sporadic necrosis, moderate hepatocyte polymorphy, and a surprising number of hepatocyte mitoses. Normalization of clinical and paraclinical signs, including reduction of the hepatomegaly, followed cessation of APR. A trial resumption of APR for 3 days led to a renewal of the previous signs and symptoms within 24 hr, with complete normalization 10 days after total cessation of the drug. The findings are compatible with a diagnosis of drug-induced hepatitis.

6715 GRANULOMATOUS CONDITION OF THE LIVER PRODUCED BY PHENYLBUTAZONE. (Dan.) Anker, N.; Skovbjerg, H. (Fjordparken 10, DK-4000 Roskilde, Denmark). *Ugeskr. Laeger* 137(51):3038-3039; 1975.

A case of liver granuloma occurring after treatment with phenylbutazone is described. The patient was a 58-yr-old woman with no known allergic sensitivities. Treatment for a prior zoster condition had included phenylbutazone (300 mg daily for 3 weeks, for a total of 5.8 g). Icterus and erythema followed, together with indigestion, discoloration of stools, fever, and edema of the hands and feet. There was no reason to suspect either serum or infectious hepatitis. Most clinical tests showed negative results, but a liver biopsy revealed a granulomatous condition in the parenchyma and hepatic portal, with eosinophilia. No other abnormalities were observed. All symptoms disappeared within 14 days of cessation of treatment with phenylbutazone, and a liver biopsy taken 6 months later was normal. The granuloma appears to have been a hypersensitive reaction to phenylbutazone.

6716 GRANULOMATOUS HEPATITIS, INCREASED PLATELET AGGREGATION, AND HYPERCHOLESTEROLEMIA. (Eng.) Yon, J. L.; Anuras, S.; Wu, K.; Forker, E. L. (Univ. Hosps., Iowa City, IA 52242). *Ann. Intern. Med.* 84(2):148-150; 1976.

6717 LIVER DISEASE CAUSED BY MEDICINAL AGENTS. (Eng.) Zimmerman, H. J. (Veterans Admin. Hosp., Nashville, TN 37203). *Med. Clin. North Am.* 59(4):896-908; 1975.

6718 HEPATIC PATHOLOGY AND SKIN TEST REACTIONS TO TRIFLUORO-ACETYLATED AUTOLOGOUS PROTEIN AFTER REPEATED HALOTHANE ANAESTHESIA IN THE GUINEA-PIG. (Eng.) Reves, J. G.; McCracken, L. E., Jr. (Univ. Alabama Medical Center, Birmingham, AL). *Br. J. Anaesth.* 48(5):419-424; 1976.

6719 FATAL HEPATIC NECROSIS DUE TO ISONIAZID CHEMOPROPHYLAXIS IN A 15-YEAR-OLD GIRL. (Eng.) Vanderhoof, J. A.; Ament, M. E. (Sch. Medicine, Univ. California, Los Angeles, CA 90024). *J. Pediatr.* 88(5):867-868; 1976.

See also, 6249, 6739, 6787.

LIBRARY U. OF I.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

6720 THE PREVENTION OF VIRAL HEPATITIS. (Eng.) Krugman, S. (New York Univ. Medical Center, 550 First Ave., New York, NY 10016). *Ann. Clin. Res.* 8(3):216-220; 1976.

The epidemiology of hepatitis A virus and hepatitis B virus and the prevention of infection by these viruses are reviewed. The type A virus is spread from person to person via the fecal-oral route during the end of the incubation period and for about two weeks after onset of the symptoms. There is no carrier state. Besides physical contact, the disease is spread via food, milk, and water. Passive immunization can be effected with standard human immune globulin (ISG), and is recommended for those who have had intimate exposure to the disease. Active immunization has not yet been developed and is contingent on the successful cultivation of the virus *in vitro*. The type B virus is usually transmitted parenterally via contaminated blood, blood products, and needles. It may also be transmitted via intimate personal contact, particularly in areas with primitive sanitary conditions. Blood for transfusion from commercial donors has a 10- to 15-fold greater risk of carrying infection than blood from volunteers. Equipment, if reused, should be boiled for 10 min or autoclaved at 15 lbs pressure or by dry heat at 338 F for 30 min. The efficacy of ISG for prevention of type B infection depends on the amount of protective antibody in the particular preparation and on the dose of virus transmitted during exposure. Studies with a high titer hepatitis B ISG preparation showed a significant protective effect. It is recommended that either hepatitis B ISG or standard ISG be given to infants exposed *in utero* or at birth. Evidence has shown that heat-inactivated serum has a protective effect as an active immunizing agent. The results indicate the feasibility of developing a vaccine using purified HBsAg, in spite of the fact that the virus has not been isolated in cell culture.

6721 PREVENTION OF NOSOCOMIAL VIRAL HEPATITIS, TYPE B (HEPATITIS B). (Eng.) Snydman, D. R.; Bryan, J. A.; Dixon, R. E. (Center Disease Control, Atlanta, GA 30333). *Ann. Intern. Med.* 83(6):838-845; 1975.

Measures for preventing nosocomial viral hepatitis B are outlined. The keystone of an effective hepatitis control program in the hospital is the adequate surveillance of patients and personnel, especially in high-risk areas such as dialysis units, hematology-oncology units, and clinical pathology laboratories. Other preventive measures include good personal hygiene, avoiding habits that favor the transmission of the disease (nail biting, putting hands in the mouth, and chewing on various objects), the provision of adequate washing facilities, the sterilization and disinfection of instruments and equipment, and the use of protective clothing. Individuals with well-defined histories of inoculation or exposure to known hepatitis B surface antigen (HBsAg)-positive blood or fluids (accidental needle punctures or accidental ingestion) may benefit from the administration of standard immune globulin of recent manufacture (0.04-0.10 ml/kg) after the institution of prompt local measures (thorough washing of the exposed area). Data currently available suggest that employees who have persisting HBsAg need not be removed from their positions unless they have been shown to disseminate infection. If HBsAg persists for 6 months or longer, liver function and histologic data should be evaluated for chronic active hepatitis.

6722 THE PROGRAM OF THE WORLD HEALTH ORGANIZATION IN THE INTERNATIONAL SURVEILLANCE OF VIRAL HEPATITIS B. (Eng.) Sobeslavsky, O. (Virus Diseases Unit, World Health Organization, Geneva Switzerland). *Am. J. Med. Sci.* 270(2):283-285; 1975.

The epidemiology of hepatitis B in different areas of the world is being studied by the World Health Organization. The first phase of the study consisted of evaluation of antiserum to hepatitis B surface antigen (anti-HBsAg). The serum has been approved for use as a reference reagent by the National Institutes of Health and contains antibody to the D and Y subtypes. Collaborating laboratories in 27 countries titrated this serum against their own locally available serum controls. A high degree of specificity and sensitivity was shown uniformly for the reagent sera. A second phase of the study is now in progress and is concerned with defining the prevalence of hepatitis B antigen and antibody in the general populations and with identifying high-risk groups. Collected sera would be tested for antibody by discontinuous counter-immunoelectrophoresis using the anti-HBs reagent and by reverse passive hemagglutination. It is suggested that prospective studies of transfused patients could aid in assessing the kinetics and specificity of antibodies to different hepatitis B antigen components.

6723 TREATMENT OF ACUTE VIRAL HEPATITIS WITH LEVULOSE INFUSIONS. (Ger.) Bode, J. Ch.; Bungartz, G.; Dolle, W. (Medizinische Universitatsklinik, 355 Marburg, Mannkopffstr. 1, W. Germany). *Dtsch. Med. Wochenschr.* 101(2):43-47; 1976.

Experiences with fructose management of acute hepatitis in 109 patients (group A) are compared with those in 91 hepatitis patients (group B) without fructose. Both groups were similar in age composition and number of patients receiving glucocorticoids, calorie-rich, light diets, and bed-rest. Group A received an average 900 ml (500-2,000 ml, i.v.) of a 59% fructose solution daily for the first 3 weeks. Serum transaminase and bilirubin were monitored for 40 days after the onset of therapy. Differences between groups A and B were negligible for 15 days after the onset of icterus. After day 20, the average bilirubin concentration was significantly higher ($p<0.01$) in group A. The typical spontaneous fall in bilirubin concentration 3 weeks after the onset of icterus was postponed for 1 week in group A. Only in the seventh week were the average values for both groups approximately equal. The group difference in SGPT decline was insignificant, with the slope of the curves approximately the same; group A values were slightly higher throughout the decline. The average duration of illness was a function of age in both groups, with a somewhat shorter duration for group B patients in most age classes. Compatible with a survey of relevant literature, fructose infusion confers no therapeutic advantage.

6724 PROBLEMS OF HEPATITIS IN DIALYSIS PATIENTS, THE SUPPORT STAFF AND THEIR RELATIONS. (Ger.) Schirmer, K.; Sohn, U.; Hajduk, F.; Woratz, G.; Zimmermann, S.; Agsten, E.; Schreiber, M. (Klinikum am Kuchwald, 90 Karl-Marx-Stadt, E. Germany). *Z. Gesamte Inn. Med.* 30(17):579-582; 1975.

The incidence of hepatitis in dialysis patients and in the support staff and their relations was reviewed during a 2-yr monitoring period. The risk group consisted of 14 patients, 12 nurses, and 5 physicians. Australia antigen (Au Ag) was detected in nine patients, two nurses, and two family members (of one nurse and one patient). The four affected members of the nonpatient group presented with frank icterus and elevated serum bilirubin (maximum 21 mg/100 ml). Bilirubin elevations were infrequent in patients. Serum transaminases in nonpatients were markedly increased (over 800 IU), but were only moderately elevated in all Au Ag-positive patients (maximum SGOT, 120 IU; SGPT, 180 IU). The general status of the nine affected patients was poor. The interval between Au Ag demonstration and the onset of serum transaminase elevation varied in patients from several days to 6 weeks; excepting two patients, Au Ag levels remained constant, while serum transaminase was normalized after several weeks. The two patients with waning Au Ag had prominent right heart insufficiency. The patients received no corticoid or immunosuppressive therapy before or during dialysis. In nonpatients, the extinction of Au Ag levels followed serum transaminase normalization. Au antibodies were found in one patient and one nonpatient who had had a hepatitis infection 8 yr previously. Isolation and disinfection procedures in affected dialysis clinics are discussed.

6725 PHYSIOPATHOLOGY OF HEPATITIS B VIRUS INFECTION.

(Fre.) Guignard, D.; Nydegger, U.; Lambert, P. H.; Miescher, P. A. (Hopital Cantonal, CH-1211 Geneve 4, Switzerland). *Schweiz. Med. Wochenschr.* 105(33):1033-1040; 1975.

Forty-eight of 10,000 blood donors were found to be asymptomatic and hepatitis B associated antigen (HBAg)-positive. Histopathological examination of the liver of 25 revealed abnormal pathology (inflammatory foci, chronic hepatitis, and postnecrotic cirrhosis, etc.) in all but 6 subjects. Thrombocytopenia was present in 17% and bone marrow studies of six of eight carriers with less than 100,000 platelets/mm^3 revealed numerous megakaryocytes and normal morphology. Transaminases, SGOT, and SGPT were moderately elevated (<50 IU/liter) in 20/48 asymptomatic carriers. When carriers were categorized according to subtype of HbAg, 54% exhibited the surface antigen *ad*; 34%, *ay*; and 12%, *ad/ay*. A similar distribution of HbAg subtyping was found in a group of 82 hepatitis B patients. The serum of 31 patients studied for the presence of antigen-antibody complexes (Clq binding test) revealed 11 with detectable levels of the circulating complex; 2/3 patients with HbAg positive polyarteritis nodosa also had circulating antigen-antibody complexes. The Clq binding test was negative in all the asymptomatic HbAg positive blood donors tested. The authors discuss the pathophysiologic implications of hepatitis B infection and conclude that the main defense mechanism leading to elimination of the viruses within the hepatocytes is cell-mediated immunity. Hepatitis would then represent the side reaction of this defense mechanism. Polyarteritis nodosa may result from local antibody interaction with antigen fixed within arterial walls.

6726 DETECTION OF HBsAg AND HBsAb IN SWEAT.

(Eng.) Brodersen, M.; Wirth, M. (Medizinische Univ. Klinik, Luitpoldkrankenhaus, Josef-Schneider-Str. 2, 8700 Wurzburg, W. Germany). *Acta Hepatogastroenterol.* 23(3):194-201; 1976.

HBsAg excretion was studied in the sweat of 18 HBsAg-positive and 20 HBsAg-negative subjects, and HBsAb excretion was studied in 5 HBsAb-positive and 10 HBsAb-negative subjects. The subjects showered and dried, and the sweat was collected during a 45-min application of heat. In the HBsAg study, sweat amounts varied from 11 to 550 ml; the concentration was 7-220-fold. HBsAg was detectable by radioimmunoassay only, and occurred in nine seropositives and no seronegative controls ($p<0.01$). There was no difference between subtype D (7/13) and subtype Y (2/4). The frequency of HBsAg detection in sweat correlated well with serum titer and blood contamination. Sweat HBsAg occurred more often in acute and chronic persisting hepatitis than in cirrhosis. There was a striking difference in the serum titer in these groups (9/10 were immunodiffusion positive in acute and chronic persisting hepatitis, but only 1/5 cirrhotics were). HBsAg sweat occurred at a 10^6-10^7-fold lower concentration than the corresponding serum antigen. Centrifugation in CsCl revealed a density of 1.25 and 1.21 g/cm^3 for sweat and corresponding serum HBsAg. The quantity of sweat in the HBsAb study ranged from 60 to 840 ml; the concentration was 50-560-fold. Quantitation in sweat from the negative subjects was low, with little variation, while in the positive group it was higher and spread over a wide range. The difference between the groups ($p<0.01$) indicates a specific binding of HBsAg in the positive group. There was a striking similarity in quantitation between sweat specimens from the negative group and the negative control serum. Assuming this similarity to be proof of the nonexistence of sweat HBsAb in negative subjects, four of five seropositive subjects had HBsAb in their sweat. Centrifugation showed HBsAb activity in both serum and sweat to be confined to immunoglobulin G (IgG)-containing fractions. Anti-alpha antiserum did not impair activity, but anti-Y activity completely inhibited it. Specific activity was 480 and 437 counts per min/mg IgG for serum and sweat, resp. The results suggest that HBsAg may serve as a marker to calculate infectivity of sweat, compared to the corresponding serum specimen, and that HBsAb in sweat could provide protection against reinfection by contact.

6727 CORE AND SURFACE ANTIGEN OF THE DANE PARTICLE IN LIVER TISSUE: RELATION TO DIFFERENT FORMS OF HEPATITIS B.

(Ger.) Bianchi, L.; Gudat, F. (Institut fur Pathologie, Universitat Basel, Schonheinstrasse 40, CH-4056, Basel, Switzerland). *Leber Magen Darm* 5(5):180-195; 1975.

The differential serological and histological behavior of hepatitis B antigenic components (HBAg) in 67 patients with different types of hepatitis was explored by immunofluorescence (IF) and light and electron microscopy. The patients were divided into two groups. One consisted of 20 renal transplant patients under immunosuppressive (IS) therapy (azathioprine, 0.5-4.0 mg/kg/day; prednisone, 15-300 mg/day; and antilymphocyte globulin) for 2-12 weeks after surgery. There were 5 HBAg-positive and 15 -negative cases. The second group consisted of 47 patients with spontaneous hepatitis; 25 were HBAg-positive and 22 were -negative. In the transplant group, there were 16 cases of nonspecific reactive hepatitis (NRH), 14 of which were negative for hepatitis B core antigen (HBcAg); 3 cases of portal hepatitis (chronic persistent type), 1 of which was negative; and 1 case of periportal hepatitis (active chronic hepatitis) under IS therapy. The involvement of the entire hepatocyte nucleus by HBc was typical of NRH. Every type of hepatitis except subacute hepatic necrosis occurred in the spontaneous hepatitis group. No tissue correlate could be found for 7/25 seropositive cases. Of the 18 positive patients, periportal and lobular types were equally HBc- and HBsAg, while portal, nonspecific reactive, and histo-carrier hepatitis types were predominantly HBsAg. Based on the two groups, four histotypical responses are recognizable: HBc predominance (IS type), elimination type (little or no HBAg), HBc+s equivalence (active type), and HBs predominance (carrier type).

6728 RESULTS OF THE FOLLOW-UP EXAMINATIONS OF AUSTRALIA ANTIGEN-POSITIVE SUBJECTS WITH CONTACT WITH HEPATITIS PATIENTS.

(Ger.) Schulze, B.; Ullmann, R.; Konnecke, M.-L.; Scholtze, K. (Inspektion Kommunalhygiene, Hygiene-Instituts des Bezirkes Erfurt, 50 Erfurt, Predigerstrasse 6, E. Germany). *Z. Aerztl. Fortbild. (Jena)* 70(1):40-42; 1976.

Epidemiological studies of the presence of Australia antigen (AuAg) in 416 persons exposed to hepatitis patients are analyzed. AuAg was positive by complement-fixation in 76, and 146 showed positive enzymatic evidence of hepatitis. Of these, 75 were found to have acute liver involvement, including 59 abortive, 10 anicteric, and 6 icteric hepatitides; 12 were AuAg-positive. AuAg was detectable in 64 subjects who were clinically and paraclinically negative; subsequent examination of 50 of these found 3 with hepatosplenomegaly and 2 with serum lability and dysproteinemia. The implications of "healthy carriers" are discussed.

6729 BIOCHEMICAL CHARACTERIZATION OF AUSTRALIA ANTIGEN: EVIDENCE FOR DEFECTIVE PARTICLES OF HEPATITIS B VIRUS.

(Eng.) Gerin, J. L.; Ford, E. C.; Purcell, R. H. (Molecular Anatomy Program, Oak Ridge Natl. Lab., 5640 Fishers Lane, Rockville, MD 20852). *Am. J. Pathol.* 81(3):651-668; 1975.

The existence of subpopulations of Dane particles obtained from the sera of high-titered asymptomatic carriers of the hepatitis B surface antigen (HBsAg)/*adw* and HBsAg/*ayw* subtypes was demonstrated by the staining properties of the particles' internal cores and by differences in the buoyant densities of these particles in cesium chloride. When 12 *adw* and 12 *ayw* plasma units from chronic HBsAg carriers were examined by immune electron microscopy, no significant differences were observed with regard to subtype in terms of the proportion of units containing either Dane particles (92% for *adw* and 75% for *ayw*) or circulating immune complexes (75% for adw and 67% for *ayw*). Thus, most if not all asymptomatic carriers of HBsAg appear to circulate virions in their sera, regardless of subtype. Electron microscopy revealed that Dane particles could be classified based on the staining properties of their internal cores into those having full cores, partially full cores, or empty cores. Quantitative evaluation of six Dane particle-rich preparations showed that the percentage of Dane particles with full cores ranged from 3.4-13.0%, with an average value of 7.2%; the percentage of particles with empty cores ranged from 2.8-16.5%, with an average value of 8.9%. In contrast, the bulk of these Dane particles (average of 83.9%) contained partially full cores, with the percentage of such particles ranging from 72.2-91.2%. These partially full core-containing particles appeared to be deficient in viral nucleic acid and are postulated to be defective interfering forms of hepatitis B virus. Isopycnic banding of a 20-fold concentrate of Dane particles in cesium chloride revealed two populations of particles at densities of 1.19 and 1.25 g/cm^3, resp.; the demonstration of density subpopulations of Dane particles appears to verify the prediction of this result based on the staining properties of Dane particle cores. The bulk of the Dane particles, which appear to be defective interfering particles, may constitute a factor in the persistence of noncytocidal hepatitis B virus infection in man, as represented by the asymptomatic chronic HBsAg carrier.

6730 DISTRIBUTION OF D AND Y SUBTYPES IN AUSTRALIA ANTIGEN (AuAg)-POSITIVE LIVER DISEASES.

(Ger.) Kindler, U.; Schoppe, W. D.; Arnold, H. G. (I. Med. Klinik A der Universitat, 4000 Dusseldorf, Moorenstrasse 5, W. Germany). *Med. Welt* 26(37):1635-1637; 1975.

The role of the D and Y subtypes in Australia antigen (AuAg)-positive liver diseases was examined in 94 patients. The D subtype was found in 38 cases of acute hepatitis, 5 cases of chronic persisting hepatitis, 2 cases of chronic active hepatitis, and in 3 cases of cirrhosis. The Y subtype was found in 37 acute hepatitis cases, 5 chronic persisting hepatitis cases, and 3 chronic active hepatitis cases. The sex distribution within the subtypes was normal. In patients under 30 yr, the Y subtype predominated, while in those over 30, the D subtype was predominant. Only the D subtype was found in five cases with transfusion anamnesis; the Y subtype was found in seven cases of drug dependency. In parenteral "injection anamnesis," there were 16 cases of D and 12 cases of Y. Among paramedical personnel, D was positive in 8 and Y was positive in 10. Similarly, in patients with either contact or parenteral infection, D was found in four and Y in three. Prodromal liver diseases were not preferentially biased toward subtype, but certain correlations with biochemical variables were found. In subtype D, the maximum GOT level exceeded 1,000 mU/ml more frequently than did the level in Y. GPT and serum transaminase showed no subtype correlation. The subtype distribution in the ratio of diseases with complications to those without complications was 13:22 for D and 10:24 for Y. There was no preferential subtype bias in 13 of 23 cases of fulminating, cholestatic, persistent, or recurrent hepatitis in patients who had taken potentially hepatotoxic drugs (barbiturates, chloramphenical, or laxatives) before the onset of the disease. Although AuAg subtypes are important epidemiological indicators, they are not pathognomonic of acute liver diseases.

6731 e-ANTIGEN IN ACUTE AND CHRONIC HEPATITIS. (Ger.) Fay, O. H.; Tanno, H.; Roncoroni, M.; Findor, J.; Igartua, E. B.; Domecq, R. (Inst. Biochemical Studies, Mitre 1174, Rosario, Argentina). *Leber Magen Darm* 5(4):140-142; 1975.

The presence of early (e)-antigen was correlated with the clinical course of different forms of hepatitis. The test sample included 88 cases of hepatitis B antigen (HBs)-positive acute hepatitis with rapid healing (group 1); 75 patients with HBs-negative acute hepatitis with rapid healing (group 2); 15 cases of HBs-positive acute hepatitis that developed into the chronic form (group 3); 94 patients with HBs-positive chronic liver disease, including chronic active hepatitis, persistent hepatitis, and cirrhosis (group 4); and 50 cases of HBs-negative chronic liver disease, including 31 cirrhotics. In group 1, the e-antigen was found in nine patients; it was found in none of the group 2 patients. Eight patients in group 3 were e-antigen-positive with acute hepatitis, and remained positive during the chronic course of the disease. In group 4, 48 patients were e-antigen-positive, and in group 5, none were positive. Of the 197 HBs-positive patients, 65 (33%) were also e-antigen-positive, independent of disease type. Eight of 17 (47%) e-antigen-positive cases developed a chronic form, and 7/86 e-antigen-negative cases healed spontaneously, i.e., developed chronically. E-antigen is assumed to play a role in the etiology of chronic hepatitis.

6732 HUMORAL AND CELLULAR IMMUNE PHENOMENA IN ACUTE VIRAL HEPATITIS. (Ger.) Sodomann, C.-P. (Medizinische Universitatsklinik, D-3550 Marburg/Lahn, Mannkopffstrasse 1, W. Germany). *Leber Magen Darm* 5(4):123-131; 1975.

The significance of immune events in viral hepatitis A and B is reviewed. Initially, the relative and absolute counts for thymus lymphocytes are depressed, while the counts for "null" cells are elevated. Mild elevation in serum globulin levels occurs: immunoglobulin M (IgM) augmentation is fast, pronounced, and long-lasting, while IgG augmentation occurs later, is less pronounced, and is shorter lived. In some patients, low titers of autoantibodies to smooth muscle and mitochondria arise, as well as specific antibodies to the "early"-antigen and antibodies to the hepatitis A antigen (HBAg) in some hepatitis B cases. Immune complexes (i.e., HBAg, IgG, and probably IgM and IgA) and complement develop in some cases; levels of the fourth component of complement become depressed, and in cases complicated by allergic symptoms, there may be a decrease in C_3, C_4, and total complement. Activation of lymphocytes (virocytes) occurs in the peripheral blood. Enhanced spontaneous lymphocytic DNA synthesis develops as well as enhanced phytohemagglutinin stimulation of lymphocytes. During the acute and convalescent stages of hepatitis B, there may be a mild proliferation of lymphocytes to HBAg. In some hepatitis B patients, a migration inhibiting factor to the liver specific protein of lymphocytes is produced. In addition, the origin and diagnostic and prognostic importance of the immune phenomena are discussed.

6733 HEPATITIS: CURRENT STATUS OF ETIOLOGY AND PREVENTION. (Eng.) Krugman, S. (New York Univ. Sch. Medicine, New York, NY). *Hosp. Prac.* 10(11):39-46; 1975.

6734 VIRAL CAUSES OF HEPATITIS. (Eng.) Fiala, M. (Harbor General Hosp., 1000 West Carson St., Torrance, CA 90509). *West. J. Med.* 123(3):202-210; 1975.

6735 HEPATITIS B ANTIGEN AND VIRAL HEPATITIS TYPE B IN INDIA. (Eng.) John, T. J.; Carman, R. H.; Hill, P. G. (Dept. Pediatrics, Univ. Arizona, Tucson, AZ). *Bull. WHO* 51(6):617-620; 1974.

6736 EVIDENCE OF HEPATITIS B INFECTION IN HOSPITALIZED CHILDREN IN NEW YORK CITY [Letter to Editor]. (Eng.) Cherubin, C. E.; Szmuness, W.; Harley, E. J.; Much, M. I.; Roldman, E. (Jewish Hosp. and Medical Center, 555 Prospect Place, Brooklyn, NY 11238). *J. Pediatr.* 88(5):893-895; 1976.

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Univ.-International Center Medical Res., San Jose, Costa Rica). *Am. J. Med. Sci.* 270(2):309-312; 1975.

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6742 NATURAL HISTORY OF VIRAL HEPATITIS IN GREENLAND. (Eng.) Skinhoj, P. (Bispebjerg Hosp., Copenhagen, Denmark). *Am. J. Med. Sci.* 270(2): 305-307; 1975.

6743 THE 1971-72 EPIDEMIC OF ACUTE VIRAL HEPATITIS IN GODTHAAB, GREENLAND. (Eng.) Grove, O.; Larsen, F. B.; Reinicke, V. (Queen Ingrid's Hosp., Godthaab, Greenland). *Scand. J. Gastroenterol.* 11(3):257-262; 1976.

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6746 PASSIVE IMMUNOTHERAPY IN HBsAg FULMINANT HEPATITIS. (Eng.) Gateau, Ph.; Opolon, P.; Nusinovici, V.; Yvart, J.; Caroli, J. (Centre hospitalier universitaire Saint Antoine, Paris, France). *Digestion* 12(4/6):304-305; 1975.

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6748 THE USEFULNESS OF LIVER BIOPSY IN A DRUG ABUSE AND HEPATITIS EPIDEMIC. (Eng.) Glaser, J. P. (Univ. Rochester Sch. Medicine, Rochester, NY 14620). *Med. Bull.* 32(8):257-259; 1975.

6749 VIRAL TYPE A AND TYPE B HEPATITIS. MORPHOLOGY, BIOLOGY, IMMUNOLOGY AND EPIDEMIOLOGY: A REVIEW. (Eng.) Dmochowski, L. (Univ. Texas System Cancer Center, Houston, TX 77025). *Am. J. Clin. Pathol.* 65(5):741-786; 1976.

6750 THE VALUE OF HEPATITIS B ANTIGEN IN THE DIAGNOSIS OF CHRONIC HEPATITIS AMONG SOLDIERS WHO VOLUNTEER TO DONATE BLOOD. (Ser.) Grahovac-Bublik, M.; Vondracek, O.; Marchiotti, S.; Stefanovic, R.; Apic, R.; Krstulovic, B. (Military Hosp., Zagreb, Yugoslavia). *Vojnosanit. Pregl.* 32(2):120-123; 1975.

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6755 CLINICAL AND EPIDEMIOLOGIC SIGNIFICANCE OF THE HEPATITIS B SURFACE ANTIGEN (HBsAG) SUBTYPES d AND y [Abstract]. (Eng.) Thamer, G.; Kommerell, B. (Medizinische Universitatsklinik, Heidelberg, W. Germany). *Digestion* 12(4/6):354; 1975.

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6757 C3 METABOLISM IN HBsAg POSITIVE AND NEGATIVE CHRONIC ACTIVE LIVER DISEASE (CALD) [Abstract]. (Eng.) Elias, E.; Potter, B. J.; Thomas, H. C.; Sherlock, S. (Royal Free Hosp., Pond St., London, NW3 2QG, England). *Gut* 17(5):389; 1976.

6758 THE 'e' ANTIGEN AS A MARKER OF CHRONIC LIVER DISEASE IN HEPATITIS B ANTIGEN-POSITIVE PATIENTS AND BLOOD DONORS [Abstract]. (Eng.) Sheikh, N. E.; Woolf, I. L.; Galbraith, R. M.; Dymock, I. W.;

Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 12(4/6):279; 1975.

6759 VIRAL HEPATITIS AND CIRRHOSIS. (Eng.) Sherlock, S. (No affiliation given). *Clin. Gastroenterol.* 4(2):281-296; 1975.

6760 HEPATITIS-B-ANTIGENEMIA WITH PANARTERITIS, DIFFUSE PROLIFERATIVE GLOMERULITIS AND MALIGNANT HYPERTENSION. (Eng.) Razzak, I. A.; Bauer, F. W.; Itzel, W. (Greater Baltimore Medical Center, Baltimore, MD). *Am. J. Gastroenterol.* 63(6):476-480; 1975.

6761 STEVENS-JOHNSON SYNDROME WITH HEPATITIS FOLLOWING THERAPY WITH AMPICILLIN AND CEPHALEXIN. (Eng.) McArthur, J. E.; Dyment, P. G. (Cleveland Clinic Foundation, Cleveland, Ohio 44106). *N.Z. Med. J.* 81(538):390-392; 1975.

See also, 6278, 6288, 6313, 6314, 6366, 6367, 6677, 6714, 6816.

LIVER AND BILIARY TRACT

Chronic Hepatitis

6762 CHRONIC PERSISTING HEPATITIS IN CHILDHOOD. (Ger.) Scholz, H. (Stadtisches Klinikum Berlin-Buch, 1115 Berlin-Buch, E. Germany). *Kinderaerztl. Prax.* 43(2):54-61; 1975.

Experiences in the management of pediatric chronic persisting hepatitis are reported. The clinical sample included 11 girls and 8 boys, 6-months-13 yr of age. Etiology in the majority was acute viral infection, at least four of which followed from contact. Only one case was frankly icteric. The physical status of the group at the onset of disease was generally satisfactory. Laparoscopy found periportal and interlobar infiltration and slight fibrosis in the periphery of the lobes or focal proliferation in 16 of the children during the first 6 months of observation. Eight cases received long-term therapy, including two with azathioprine alone, one with prednisolone alone, and two with azathioprine for 10 months, followed by corticoids. Azathioprine and prednisolone led to histologically active foci in two patients, which subsequently regressed in 1 yr; in another case with hepatomegaly and negative paraclinical data, gradually reduced doses of both drugs after 1 yr failed to suppress the onset of active hepatitis, for which prednisolone alone was subsequently given. Prednisolone is the drug of choice. In general, 3 mg/kg/day were administered for 4 weeks, after which the maintenance dose was reduced to 1 mg/kg/day, two or three times daily. Where histologically indicated, the dose can be reduced to 10 mg every other day. A 2-yr observation period is required.

6763 CHRONIC HEPATITIS FROM THE PATHOLOGIST'S POINT OF VIEW. (Ger.) Korb, G. (Pathologische Institut, Stadtische Krankenhaus, 8480 Weiden/Opf., Bismarckstrasse 30, Germany). *Therapiewoche* 25(27):3752-3760; 1975.

The nomenclature and nosology of chronic hepatitis, morphological criteria in the differential diagnosis of the active and persistent chronic types, and the need for collaboration between clinician and pathologist are briefly discussed. Chronic hepatitis does not include all non- or subacute liver inflammations, among which nonspecific reactive hepatitis, sclerosing pericholangitis, alcohol inflammation, and primary biliary cirrhosis are mentioned. Persistent chronic hepatitis is an inflammation without essential impairment of liver function and with no progressive tendency. It features infiltration of portal fields by predominantly lymphoid cells, and lamellar integrity remains without significant lobular change. In chronic persisting hepatitis, the lamellae are interrupted by "piece-meal" necroses and lobular irregularities; disturbances in portal field structure and evidence of incipient cirrhosis are best determined by laparoscopy.

6764 CHRONIC ACTIVE HEPATITIS. A CLINICAL, BIOCHEMICAL AND SEROLOGICAL INVESTIGATION. (Dan.) Dietrichson, O. (2. medicinsk afdeling, Kommunehospitalet, DK-1399 Copenhagen K, Denmark). *Ugeskr. Laeger* 137(32):1820-1825; 1975.

The various clinical, biochemical, immunological, and serological variables of chronic active hepatitis without cirrhosis are described. Eighty-five patients with confirmed chronic active hepatitis were examined. Forty-seven cases began as acute viral hepatitis, 19 had serum hepatitis, and 6 had infectious hepatitis. Symptoms included fatigue (77), malaise (73), dark urine and light stools (67), jaundice (66), weight loss (65), abdominal pain (61), itching (27), arthralgia (24), constipation (18), and fever (18). Antinuclear antibodies were present in 46 cases, mitochondrial antibodies in 1 case, smooth muscle antibodies in 30 cases, positive Waaler-Rose results in 8 cases, positive latex test in 32 cases, postive antistreptolysin results in 11 cases, and Australia antigen in 19 cases. The patients could be divided into two groups. One group was marked by the occurrence of the Australia (hepatitis B) antigen, while the other group was marked by circulating auto-antibodies. The first group probably originated from an initial viral infection, and the second group from an immune reaction to the laxative, oxyphenisatin. The second group had higher test levels for aspartate transaminase, serum bilirubin, alkaline phosphatase, immunoglobulin G (IgG), IgA, IgM, the latex test, and the LE-cell test; their mean age was also double that for the first group. It is probable that there are other subdivisions of chronic active hepatitis without cirrhosis.

6765 CHRONIC PERSISTING HEPATITIS. A CLINICAL, SEROLOGICAL AND PROGNOSTIC STUDY. (Dan.) Dietrichson, O. (2. medicinsk afdeling, Kommunehospitalet, DK-1399 Copenhagen K, Denmark). *Ugeskr. Laeger* 137(32):1815-1819; 1975.

Chronic persisting hepatitis is described with a view to contributing to a method of diagnosis. Of the 26 confined cases seen in a 7-yr period, 22 began with acute hepatitis, of which 16 had been diagnosed as acute viral hepatitis after biopsy. Sixteen of the patients had serum hepatitis induced by practices common among addicts. Initial symptoms had been abdominal pain (21), malaise (21), fatigue (20), weight loss (18), jaundice (16), dark urine and light stools (16), itching (9), arthralgia (7), constipation (5), fever (5), and skin rash (1). Seven patients had positive Latex test results, six were positive for antistreptolysin, and 12 were positive for Australia antigen. Follow-up studies showed the development of cirrhosis in one patient and severe portal fibrosis in another. Three patients still had chronic persisting hepatitis 28 months later. Chronic persisting hepatitis may be a result of acute viral hepatitis. Chronic persisting hepatitis may be confused with chronic aggressive hepatitis in a stage of lowered activity, which may explain the seemingly low incidence of the disease. All patients with chronic persisting hepatitis should undergo follow-up biopsy.

6766 PROGNOSIS OF UNTREATED AND TREATED CHRONIC ACTIVE HEPATITIS. (Ger.) Knoblauch, M.; Ammann, R.; Clavadetscher, P.; Grob, P.; Schmid, M. (Leitender Arzt, Medizinische Klinik, Kantonsspital, CH-8091 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 106(9):315-316; 1976.

The outcome of long-term management of chronic active hepatitis, with or without cirrhosis, was analyzed in 121 cases. Patients with subacute necrotizing hepatitis and terminal cirrhosis were excluded. The average treatment interval was 5 yr, 4 months; 106 patients were followed more than 3 yr. Therapy consisted of initial steroids, subsequent combinations of steroids and azathioprine, and a maintenance regimen of 10-15 mg prednisone and 50-100 mg azathioprine. Six patients died of hepatoma, and 23 died of cirrhosis (24%). Mortality in an untreated group was 33%; in the long-term management group, mortality was 11%, and in a group under short-term control (where only the crisis was treated), mortality was 25%. After 3 yr, mortality was 20% in the untreated group, 12.5% in the short-term treatment group, and 5.5% in the long-term treatment group. After 5 yr, mortality was 25% in untreated patients, 17.5% in short-term treatment, and 5.5% in long-term treatment. Long-term mortality was significantly less than that in untreated patients at 1, 3, and 5 yr. Mortality was 50% in 20 patients with concurrent autoimmune diseases. Patients with chronic active hepatitis 2b and cirrhosis had a 57% mortality. At the end of the observation, 36 cases of inactive cirrhosis included 30 under treatment. Complete healing occurred in 13 noncirrhotic chronic active hepatitis patients, with equal distribution among the treatment groups. Transitions from 2a to 2b or 2b to 2a appeared with equal frequency in treatment and nontreatment groups.

6767 CORRELATION BETWEEN FUNCTIONAL DIAGNOSIS AND HISTOLOGY IN CHRONIC HEPATITIS IN CHILDHOOD. (Ger.) Burdelski, M.; Lucking, Th.; Natzschka, J. (Kinderklinik, Medizinische Hochschule, Karl-Wiechert-Allee 9, D-3000 Hannover 61, W. Germany). *Monatschr. Kinderheilkd.* 124(5): 380-381; 1976.

The relation between the degree of histological change and serum enzyme or protein levels, independent of the type of chronic hepatitis, and between the serum levels and hepatitis type was examined in 15 patients aged 7 months to 14 yr. Chronic persistent hepatitis (CRH) was confirmed in 10 patients, and chronic progressive hepatitis (CGH) was confirmed in 9. Three patients with CGH were also cirrhotic. Aspartate aminotransferase (SAT), alanine aminotransferase (LAT), and glutamic dehydrogenase (GDH) were slightly to moderately elevated in all patients, with corresponding parenchymal changes; no difference between CRH and CGH could be established. Cholinesterase was unchanged. Gamma-glutamyl transpeptidase (GGT) was insignificantly higher in CGH, especially with cirrhosis, than in CRH, but was somewhat lower than in six children with chronic hepatosis (CHT). The SAT/LAT quotient was approximately the same for CRH, GGH, and CHT. The SAT + LAT/GDH value was insignificantly larger in CGH than in CRH or CHT. Although unity was exceeded in individual cases of CGH for the GGT/SAT ratio, the group differences were insignificant. The gamma-globulin fraction was significantly higher in CGH than in CRH or CHT, whose values were normal. Total immunoglobulin and immunoglobulin G were also significantly higher in CGH than in CRH. A typical enzyme pattern, unique to CGH, CRH, or CHT, could not be established. Elevations in enzyme activity were correlated with the degree of parenchymatal inhibition, which, with histological complementation, could be diagnostically reliable in individual patients.

6768 LONG-TERM IMMUNOSUPPRESSIVE THERAPY OF CHRONIC ACTIVE HEPATITIS. (Ger.) Schimmelpfennig, W.; Schneider, G.; Wagner, K.; Wack, R.; Lunzenauer, K. (II Med. Klinik [Charite], 104 Berlin, Schumannstrasse 20/21, Berlin, E. Germany). *Z. Gesamte. Inn. Med.* 30(23):271-273; 1975.

Experiences with immunosuppressive management of 47 cases of chronic active hepatitis are reported; 13 cases were Australia antigen (AuAg)-positive. Therapy consisted of 100 mg azathioprine and 10 mg prednisolone daily; 30 patients had previously received prednisolone alone without effect. The mean therapeutic interval was 33.8 months. Hepatomegaly was reduced in about one-third of the cases. Significant ($p<0.01$) serological normalization (thymol, $ZnSO_4$, GOT, GPT) was achieved in 4/9; electropherography and alkaline phosphatase were unchanged. Histologic amelioration was confirmed in 22/47 during punch biopsy control in an average of 3 yr; 4 patients showed exacerbation, and 10 were unaffected. A transition from the chronic active to the chronic persisting form occurred in 11/47, with augmented stromal proliferation in 6. Within 4-31 months, patients succumbed from cirrhosis and portal hypertension. Cytopenia and gastrointestinal sequelae did not appear. Rebound was present in three cases. In the AuAg-positive group, mortality was 3/13, with histological amelioration 6, exacerbation in 2, and no change in 2. A preference for combination therapy of azathioprine and reduced prednisolone (5-10 mg/day) is cited.

6769 PROBLEMS IN THE TREATMENT OF CHRONIC AGGRESSIVE HEPATITIS WITH CORTICOSTEROIDS, IMMUNOSUPPRESSIVES, AND PENICILLAMINE. (Ger.) Muting, D.; Fischer, R. (Ltd. Arzt. der Heinz-Kalk-Klinik fur Innere Medizin-Gastroenterologie, 8730 Bad Kissingen-Hausen, Am Gradierbau). *Therapiewoche* 25(27):3737, 3740, 3745-3748, 3751; 1975.

Therapeutic modalities for chronic aggressive (AH) hepatitis were analyzed. The bases of management included complete bed rest and alcohol abstinence; there was no treatment of choice. Positive results have been reported for combined prednisolone (PDN) and azathioprine (AZT) especially in early CAH; PDN should not exceed 12.5 mg, and AZT, 50-100 mg per day. Side effects include thrombopenia, leukopenia, megaloblastic anemia, portal hypertension, and hepatotoxicity. One 46-yr-old man was effectively managed initally by PDN, and later by AZT, with PDN reduced to 2.5 mg before the onset of inflammatory change and transition to incipient cirrhosis. Histological improvement followed renewal of combined PDN-AZT therapy, but succinic dihydrogenase increased and an inactive tuberculosis lesion became active. Although PDN was found to be significantly superior to AZT in monotherapeutic double blind studies, its side effects are extensive and severe. Long-term therapy with D-penicillamine (DPA), which is not antibiotic, has been effective against Wilson's disease; the side effects are not inconsiderable, so its use should be limited to inpatient intervals. Nine positive results, with one allergic exanthematous complication and one negative result, were obtained with DPA in 2.5-14 months. Only one improvement after 1 yr followed DPA management of four actively cirrhotic patients without portal hypertension. A statistical survey of 352 CAH patients under a variety of treatments found that only 12% were exacerbated, 50% arrested, and 20% improved.

6770 RESULTS OF A LONG-TERM STUDY ON THE THERAPEUTIC EFFECTIVENESS OF XANTHINOL NICOTINATE IN CHRONIC LIVER DISEASE. (Ger.) Dohrmann, R. E.; Kessel, M. E. (Ev. Waldkrankenhaus Spandau, 1 Berlin 20, Stadtrandstrasse 555, W. Germany). *Z. Allgemeinmed.* 51(26):1167-1172; 1976.

The effectiveness of xanthinol nicotinate (XN) in the management of various liver diseases was evaluated in 100 patients. There were 26 cases of fatty liver, 15 of fibrosis, 15 of cirrhosis, 9 of both fibrosis and cirrhosis, 8 of fatty liver and fibrosis, 6 of chronic hepatitis, 3 of chronic active hepatitis, 6 of persistent chronic hepatitis, and 4 of chronic hepatitis and fibrosis. Acute viral hepatitis and pathology secondary to gallbladder dysfunction were excluded. Treatment of choice was thiamine hydrochloride, whose infusion ampules contain 1,000 mg of XN. The maximum daily infusions (3-4 hr) contained 3,000 mg of XN. After clinical or paraclinical improvement, usually following a 4-week treatment, medication was reduced to a maximum daily dose not exceeding 900 mg XN. Blood chemistry was checked every 10-14 days and on suspension of XN; liver biopsies were also performed. Bed rest was mandatory. Results were compared with those from a control group of 12 patients with liver diseases, but not receiving thiamine hydrochloride. Serum bilirubin, SGOT, SGPT, and BSP retention levels were all reduced by an average of 43-67% ($p<0.001$) from initial levels after both forms of Metabolan. Albumins and gamma-globulins were only slightly increased and decreased, resp. After infusion therapy (63 cases) alone, the values fell an average of 47-66% ($p\leq0.001$; BST $p\leq0.02$), with the serum proteins showing the same pattern. In the control group, the reduction was 67% for serum bilirubin, 81% for SGOT, 85% for SGPT (all at $p<0.001$), and 31% for BSP ($p=0.40$). The albumins rose slightly, and the globulins remained unchanged. A majority of patients experienced relatively rapid general improvement. Flush reactions and skin allergies occurred in 2%, and two cases of chronic active hepatitis became persistent chronic hepatitis during XN therapy. The case histories are presented. Despite a similar normalization of serum levels in controls, XN is said to affect both the liver parenchyma and its hemodynamics favorably.

6771 PROBLEMS OF IMMUNOSUPPRESSIVE AND MESENCHYMA-SUPPRESSIVE THERAPY OF INFLAMMATORY DISEASES OF THE LIVER. (Ger.) Zipprich, B.; Busse, H. J.; Nilius, R.; Otto, L. (I. Medizinische Universitatsklinik, 402 Halle [Saale], Leninallee 22, E. Germany). *Z. Aerztl. Fortbild. (Jena)* 70(2):62-66; 1976.

Immunological phenomena in liver disease are reviewed, and experiences with D-penicillamine (DPA) therapy for active chronic hepatitis are discussed. DPA was given to 18 patients in increasing doses of from 0.9 to 1.8 g/day, with a maintenance dose of 0.9 g/day, combined with 60 mg/day of vitamin B_6. Suspension of medication was required in four cases due to intractable side effects. Normalization or amelioration was achieved in most cases, according to thymol, SGOT, SGPT, and leucine aminopeptidase values. One case with incipient cirrhosis and another with incipient primary biliary cirrhosis were exacerbated. Side effects included nephrotic syndrome, gastroenteritis, multiform exudate erythema, and taste disturbances.

6772 CELLULAR IMMUNE REACTIONS IN CHRONIC INFLAMMATORY LIVER DISEASE: TECHNIQUES. THE EVALUATION AND DIAGNOSTIC SIGNIFICANCE OF FINDINGS. (Ger.) Meyer zum Buschenfelde, K. H. (II Med. Univ.-Klinik, Johannes-Gutenberg-Universitat, 65 Mainz, Langenbeckstr. 1, W. Germany). *Z. Gastroenterol.* 13(Suppl.):252-256; 1975.

Functional tests of the thymus-dependent immune system and results of the one-phase and conventional two-phase methods of migration inhibition for the diagnosis of chronic active hepatitis were reviewed. The crucial antigen must be a liver-specific macrolipoprotein from hepatocyte plasma membranes. Untreated patients with chronic active hepatitis (HBsAg-negative) exhibit migration inhibition relative to hepatocyte plasma membranes in 75%-80% of the cases. The cytotoxicity for hepatocytes elicited with peripheral lymphocytes from chronic active hepatitis can be inhibited with purified hepatocyte plasma membrane. In HBsAg-positive hepatitis, the frequency of positive findings is significantly lower. Transient cellular immune reactions relative to hepatocyte plasma membrane are also demonstrable in acute viral hepatitis and alcohol-induced hepatitis, suggesting that cell-mediated reactions are inducible by different factors. The one- and two-phase methods also demonstrate immune reactions to HBsAg in patients with acute HBsAg-positive hepatitis. It is inferred that a cell reaction to HBsAg can be routinely shown in acute virus-B hepatitis patients who are HBsAg-negative during the disease. Cell reactions to HBsAg are rarely demonstrable in chronic HBsAg carriers (healthy persons or patients with chronic liver inflammation).

6773 A SUBGROUP OF CHRONIC ACTIVE HEPATITIS ACCOMPANIED WITH CONFLUENT HEPATIC CELL NECROSIS OF SUBLOBULAR SIZE. THE 2ND REPORT: ON THE CHARACTERISTIC FEATURES AND PROGNOSIS [Abstract]. (Eng.) Kosaka, K.; Shimada, Y.; Ohta, Y.; Kobayashi, T.; Endo, H.; Tsuji, T.; Itoshima, T.; Inoue, T.; Ohta, W.; Nozaki, H.; Yamada, G. (Okayama Univ. Medical Sch., Okayama, Japan). *Jpn. J. Med.* 13(4): 297-298; 1974.

6774 LACTIC DEHYDROGENASE (LDH) ISOENZYMES IN THE SERUM OF PATIENTS WITH CHRONIC HEPATITIS. (Eng.) Boguslawska-Jaworska, J.; Dolinska, G.; Hulska, A.; Knapik, Z.; Zawirska, B. (Dept. Gastroenterology, Inst. Internal Diseases, Medical Acad., Wroclaw, Poland). *Mater. Med. Pol.* 7(3): 197-199; 1975.

6775 DIGITOXIN PHARMACOKINETICS IN CHRONIC ACTIVE HEPATITIS [Abstract]. (Eng.) Storstein, L.; Amlie, J. (Univ. Clinic, Rikshospitalet, Oslo, Norway). *Digestion* 12(4/6):353; 1975.

See also, 6662, 6725, 6731, 6739, 6744, 6748, 6750, 6751, 6759, 6781.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

6776 COMPARATIVE LIGHT AND ELECTRON MICROSCOPIC STUDY OF LIVER CELL INCLUSIONS IN CHRONIC ALCOHOLIC LIVER DAMAGE. (Ger.) Stotzner, H.; Kemmer, Ch. (Pathologisches Institut, Medizinische Akademie "Carl Gustav Carus," 8019 Dresden, Fetscherstrasse 74, E. Germany). *Zentralbl. Allg. Pathol.* 119(5):378-386; 1975.

The ultrastructural identification of hepatocyte inclusions in 15 patients with ethanol hepatosis or hepatitis was compared with light microscopy correlates. Autophagic vacuoles stained eosinophilic and are strongly PAS-positive before and after diastase. Giant mitochondria (megamitochondria) were eosinophilic and PAS-negative, with bizarre shapes, cristae accumulations, and paracrystalline deposits. Alcoholic hyaline was nonuniformly shaped, with irregular fibrils, and was typically PAS-negative and weakly basophilic; ribosomes could be embedded. Ribosomal clusters were basophilic, occurring as free polysomes or bound to proliferating membranes of endoplasmic reticulum. The bile deposits were polymorphic, PAS-positive, and of greenish hue when fresh, corresponding electron microscopically to eosinophilic cytoplasmic inclusions, mainly from altered endoplasmic reticular membranes. Bile inclusions were attributed to lysosomal degradation and homogenization. Autophagic vacuolization has not been previously described light microscopically. None of the inclusions described were pathognomic.

6777 STUDIES ON THE ALCOHOLIC LIVER DISEASES (REPORT VI) [Abstract]. (Eng.) Oda, M.; Furuta, S.; Omori, A.; Nagata, A.; Tsukioka, J.; Takahashi, T.; Kiyosawa, K.; Akahane, Y.; Koike, Y.; Sahara, T. (Dept. Internal Medicine, Shinshu Univ., Matsumoto, Japan). *Jpn. J. Med.* 13(4):296-297; 1974.

6778 ALCOHOLIC HYALIN ANTIGEN (AHAg) AND ANTIBODY (AHAb) IN ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Kanagasundaram, N.; Kakumu, S.; Chen, T.; Leevy, C. M. (New Jersey Coll. Medicine and Dentistry, Newark, NJ). *Clin. Res.* 24(3):478A; 1976.

6779 HEPATIC ENZYME CHANGES IN ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Seymour, C. A.; Neale, G.; Peters, T. J. (Royal Postgraduate Medical Sch., London, England). *Gut* 16(10):839-840; 1975.

6780 CHARACTERISTIC PLASMA AMINO ACID ABNORMALITIES IN THE ALCOHOLIC: RESPECTIVE ROLES OF ALCOHOLISM, NUTRITION AND LIVER INJURY [Abstract]. (Eng.) Shaw, S.; Lieber, C. S. (Bronx Veterans Admin. Hosp., New York, NY). *Clin. Res.* 24(3):291A; 1976.

See also, 6150.

LIVER AND BILIARY TRACT

Cirrhosis

6781 CHANGES IN BONE MARROW MORPHOLOGY IN CHRONIC LIVER DISEASE. (Ger.) Muhiar, A. F.; Konrad, H. (Bereich Medizin, Universitat Rostock, 25 Rostock 1, Ernst-Heydemann-Strasse, E. Germany). *Wiss. Z. Univ. Rostock* 23(4/5):353-358; 1974.

The question of qualitative or quantitative changes in bone marrow secondary to liver pathology was explored. The clinical sample included 44 patients with cirrhosis, 26 with chronic hepatitis, 10 with fatty liver, 24 with liver stasis, 7 with benign occlusion icterus, and 16 with liver metastases. Sternal puncture cellularity found the following normoplastic, hyperplastic, and hypoplastic distribution, resp.: 21, 17, and 6 for cirrhotic patients; 15, 8, and 3 for those with chronic hepatitis; 7, 2, and 1 for fatty liver patients; 19, 3, and 2 for liver stasis; 6, 1, and 0 for occulsion icterus; and 11, 3, and 2 for liver metastases. Signs of portal hypertension and latent hemolysis occurred in several hyperplastic cases; hypoplastic marrow was characteristic of chronic disease with few complications. Myelography found erythropoiesis more pronounced in cirrhosis, with a conspicuous left shift in chronic hepatitis, liver stasis, and metastases. Chronic disease was associated with elevated myeloblasts and promyelocytes. Metamyelocytes and immature forms were most pronounced in cirrhosis and metastases, but a left shift was found in all groups. Qualitative myelopoietic malfunction (toxic granulation and neutrophil vacuolization) was only found sporadically in cirrhosis and liver metastases. The myelopoietic:erythropoietic quotient was depressed in all groups. Lymphocyte counts were low in all patients, especially those with chronic hepatitis and fatty liver; monocytes were also diminished. Reticular cells were increased in cirrhosis and liver metastases. Plasma cells were more frequent in all groups, especially cirrhosis and liver metastases; megakaryocytes were lower in each patient group. A comparison was made with sternal puncture pictures from 10 healthy persons. None of the cell variables studied are pathognomic of specific liver embarrassment. Marrow stimulation is found in all chronic disease. Differences occur only quantitatively, gradually by degrees.

6782 PRIMARY BILIARY CIRRHOSIS. CLINICAL, BIOLOGICAL AND HISTOLOGICAL STUDY. (Fre.) Demol, P.; De Groote, J.; Desmet, V. (Academisch Ziekenhuis St-Rafael, Capucijnenvoer 35, B-3000 Leuven, Belgium). *Acta Gastroenterol. Belg.* 38(9/10):314-328; 1975.

Eleven cases of primary biliary cirrhosis (8 women and 3 men, aged 49-76 yr) are reported with a clinical, histological, and biologi-

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cal review. All patients presented with symptoms of pruritus, moderate icterus, and hepatomegaly; three patients had xanthelasmatosis, and five had splenomegaly. Associated autoimmune syndromes were absent and complications were rare (1 osteomalacia, 2 osteoporoses, and 1 esophageal varice). Two patients suffered from hepatocellular insufficiency; there were no hepatic comas, which are the most frequent cause of death in this syndrome. Treatment (cholestyramine or prednisone with azathioprine) did not appear to influence evolution of the disease. The patients were followed for a period of 1.5 to 10 yr and the course of illness was slightly worse in the treated patients.

6783 DIFFUSION DISTURBANCES IN PATIENTS WITH LIVER CIRRHOSIS. (Ger.) Schomerus, H.; Hilpert, P. (Medizinische Univ.-Klinik, Abt. I und II, D-7400 Tubingen, W. Germany). *Z. Gastroenterol.* 14(3):378-387; 1976.

The changes in the diffusion potential (DP) of pulmonary alveolar membranes (AM) and capillary blood volume (CV) in contact with alveoli were investigated in 17 patients with confirmed cirrhosis, and compared with 11 controls without liver or lung pathology. The sitting patients inhaled a mixture of 21% O_2, 12% He, 0.3% CO and nitrogen, submaximally, and exhaled after a 9-10-sec apnea. After discarding the first liter of air, the alveolar air was assayed for O_2, He, and CO, and the values of the alveolar variables were established. There was no radiological, clinical, or functional evidence of primary lung disease in the patients. The average total lung DP for CO was significantly lower ($p<0.01$) in patients than in controls, which is attributable to an elevated AM resistance. The average DP for AM was also lower in patients than in controls, but the capillary volume in patients was somewhat higher. The CV variation was significantly higher ($p<0.01$) in patients than in controls. The greatest increases in CV were associated with the lowest DP or AM, such that the total resistance was in the normal range. A significant ($p<0.001$) correlation between CV and DP of AM was established in patients. The ventilatory or perfusion dysfunctions reported for cirrhotic patients could not be confirmed.

6784 SERUM-GASTRIN IN CIRRHOSIS. (Eng.) Lauritsen, K. B.; Rehfeld, J. F.; Christiansen, L. A.; Juhl, E.; Stadil, F. (Undervisningsparillon 1 Bispebjerg Hosp., 2300 Copenhagen NV, Denmark). *Scand. J. Gastroenterol.* 11(37):33-34; 1976.

To investigate the relation between increased serum gastrin levels and cirrhosis, the basal serum gastrin concentrations were measured in 50 cirrhotic patients grouped according to alcohol consumption and cirrhotic activity. Alcoholism was defined as a daily intake of five or more drinks during a period of 5 yr or longer, and 27 patients fit into this category. Activity of the liver disease was graded as follows: inactivity, normal gammaglobulin and SGPT concentrations; slight activity, two- to threefold increases in one or both parameters; and moderate and severe activity, a more than threefold increase in one or both parameters. In 120 normal subjects, the mean serum gastrin concentration was 24 pM, while in the cirrhotic patients it was 45 pM ($p<0.05$). In the patients with alcoholic cirrhosis, the mean gastrin concentration was only slightly enhanced (29 pM), while that in the 23 patients with nonalcoholic cirrhosis was highly increased (64 pM, $p<0.01$). The mean concentrations in the patients with slightly active disease were increased both in the alcoholic patients (22 pM) and the patients with nonalcoholic cirrhosis (34 pM) in comparison with those in inactive disease (32 and 96 pM in alcoholic and nonalcoholic cirrhosis, resp.) These findings support the suggestion that the liver plays a significant role in the metabolism of circulating gastrin.

6785 EMERGENCY AND ELECTIVE SURGICAL TREATMENT OF PORTAL HYPERTENSION. A REVIEW OF 23 YEARS' EXPERIENCE. (Eng.) Kirby, R.; Burke, F. D.; Jones, J. D. T. (General Hosp., Hartlepool, England). *Ann. R. Coll. Surg. Engl.* 57(3):148-158; 1975.

A retrospective review of surgical treatment for portal hypertension in 160 patients during a 23-yr period is reported, and the immediate and subsequent management of patients with bleeding esophageal varices is discussed. Fifty-four patients with recurrent varix hemorrhage, uncontrolled by conservative methods, were treated by esophageal transection, with a mortality of 22.2% (26.6% for the 46 cirrhotics). Thirty-two percent of the cirrhotics were alive after 2 yr, but only 12% of the survivors were considered suitable for a subsequent shunt procedure. Therapeutic portacaval anastomosis was performed on 65 patients, with a 51.2% 5-yr survival (43.5% for cirrhotic patients). Further hemorrhage due to shunt thrombosis occurred in 5.3% of the cases. The frequent occurrence of portal-systemic encephalopathy, increasing with duration of time following a shunt, is emphasized. The high morbidity and mortality in the poor-risk cirrhotic indicates that this type of patient is unsuitable for a portal-systemic shunt and is better treated by medical means.

6786 CLOTTING DISORDERS IN PORTAL HYPERTENSION. (Ger.) Heene, D. L. (Zentrum fur Innere Medizin, Justus-Liebig-Universitat Giessen, D-63 Giessen, Klinikstrasse 32 b, W. Germany). *Z. Gastroenterol.* 13(3):147-157; 1975.

A review of the multiple clotting dysfunctions constituting the clinical picture of cirrhosis with portal hypertension is presented. The hemostatic defect in cirrhosis with portal hypertension is an expression of a multiple pathological event whose clarification by the most subtle assays is not possible. In addition to the reduction in vitamin K-dependent factors, there are also metabolic disturbances. Dysfunction in splanchnic microcirculation induced by portal hypertension is probably the triggering factor. Exacerbation of the intravascularly increased turnover disturbances, such as consumption, coagulopathy, or secondary fibrinolysis, results from an impaired equilibrium between inhibitors, activators, and reticuloendothelial clearance capacity.

6787 CIRRHOSIS ASSOCIATED WITH HYPOTENSIVE THERAPY WITH α-METHYL-DOPA [Abstract]. (Eng.) Toghill, P. J.; Smith, P. G. (General Hosp., Nottingham, England). *Digestion* 12(4/6):355; 1975.

6788 IMPAIRED NATRIURETIC HORMONE ACTIVITY IN CIRRHOSIS [Abstract]. (Eng.) Wilkinson, S. P.; Moodie, H. E.; Bernardi, M.; Alam, A.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 12(4/6):361; 1975.

6789 UREA INDEX IN CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Hazenberg, H. J. A.; Gips, C. H. (Univ. Hosp., Groningen, Netherlands). *Digestion* 12(4/6):311; 1975.

6790 THE SOURCE OF BLEEDING IN PORTAL HYPERTENSION. (Eng.) Sandblom, P. (No affiliation given). *Bull. Soc. Int. Chir.* 34(3):165-167; 1975.

6791 DIAGNOSIS OF PORTAL HYPERTENSION WITH RADIOACTIVE ISOTOPES. (Eng.) Lewitus, Z. (Beilinson Hosp., Univ. Medical Sch., Tel Aviv, Israel). *Rev. Roum. Med.* 12(3):181-183; 1974.

6792 DOES LOWER ESOPHAGEAL SPHINCTER (LES) INCOMPETENCY CONTRIBUTE TO ESOPHAGEAL VARICEAL BLEEDING [Abstract]? (Eng.) Eckard, V. F.; Grace, N. D.; Kantrowitz, P. (Lemuel Shattuck Hosp., Boston, MA). *Clin. Res.* 23(5):577A; 1975.

See also, 6227, 6364, 6698, 6704, 6716, 6759, 6862.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

6793 SYSTEMIC ABSORPTION OF CONTRAST AGENT DURING ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY. (Eng.) Kaufman, B.; Gambescia, R.; Maldonado, A.; Raskin, J. B. (Jackson Memorial Hosp., 1611 NW 12th Ave., Miami, FL 33136). *Gastrointest. Endosc.* 22(3):175-176; 1976.

A case that clearly illustrates that absorption of a contrast agent, Meglumine diatrizoate, can occur is presented. Intravenous cholangiography was performed in a 42-yr-old woman for the evaluation of recurrent midepigastric pain. She had undergone cholecystectomy 4 yr previously. The results of cholangiography suggested a distal stricture or small stone in the common bile duct, and endoscopic retrograde cholangiopancreatography was performed. Meglumine diatrizoate was injected by hand pressure, and opacification of the main pancreatic duct was obtained. With slow withdrawal and continuous gentle injection, opacification of the common bile duct was accomplished. Both ductal systems were normal. During the injection, the patient experienced mild midepigastric discomfort while an intense pancreatic acinarization was noted. Concomitantly, the bladder was visualized with a bilateral excretory urogram. Afterward, the patient experienced moderate epigastric pain, which resolved after 24 hr. The serum amylase level was increased immediately after the procedure (732 Somogyi U), as was serum lipase (12 IU). This case demonstrates that absorption of a contrast agent during endoscopic retrograde cholangiopancreatography can occur; pancreatic acinarization was unusually prominent in this case, and probably played a significant role.

6794 PERCUTANEOUS TRANSHEPATIC CHOLANGIAL DRAINAGE: DIRECT APPROACH UNDER FLUOROSCOPIC CONTROL. (Eng.) Takada, T.; Hanyu, F.; Kobayashi, S.; Uchida, Y. (Inst. Gastroenterology, Tokyo Women's Medical Coll., 10 Kawadd-cho, Shinjuku-ku, Tokyo, Japan). *J. Surg. Oncol.* 8(1):83-97; 1976.

A method for direct percutaneous transhepatic cholangial drainage under fluoroscopic control is described. After percutaneous transhepatic cholangiography, the three-dimensional view of the intrahepatic bile ducts is projected onto a two-dimensional plane under fluoroscopy. When the puncture needle, which is covered with a Teflon tube, is introduced perpendicular to this plane in the ventrodorsal direction, it is possible to accurately puncture the selected bile duct, which is then intubated. The procedure was performed on 99 highly jaundiced patients, including 14 with carcinoma of the head of the pancreas, 4 with papilla carcinoma, 24 with bile duct and gallbladder carcinoma, 41 with metastatic carcinoma to the bile duct, and 16 with gallstone disease. In 38 of these patients, including those with gallstone disease, the technique was performed preoperatively as a preliminary decompression of the bile ducts; 28 of these patients successfully underwent radical surgery. A total of 16 patients with gallstone disease received this procedure because of severe cholangitis; five of these cases were complicated with multiple hepatic abscesses that were correctly diagnosed and successfully treated by drainage technique. In another 61 patients with inoperable advanced cancer, the technique was used to relieve jaundice; 30 of these patients showed less jaundice for more than 3 months, and 19 showed less jaundice for more than 6 months. The lives of four of these patients were prolonged for more than 1 yr when the drainage technique was followed by radiation therapy and anticancer drugs. Severe complications, such as bile leakage or intraperitoneal hemorrhage, were not observed in any of the patients treated with the above procedure. Hemobilia was noted in some cases, but did not require blood transfusions. Fever (37-38 C) occurred in some patients as a result of an elevation of the inner pressure of the bile ducts, caused by reobstruction of bile flow through the tube.

6795 CHOLECYSTECTOMY. STATISTICS, INDICATIONS, COMPLICATIONS. (Ger.) Schreiber, H. W.; Schumpelick, V.; Bartelheimer, H. (Chir. Univ.-Klinik, 2 Hamburg 20, Martinistrasse 52, W. Germany). *Med. Welt* 27(3):95-100; 1976.

Experience with cholecystectomy and its sequelae are reviewed. The clinical sample included 1,842 cholecystectomies, 329 bile duct revisions, 272 transduodenal papillectomies, 27 choledochoduodenostomies, and 23 other operations. The average patient age was 54 yr (514 cases) for men and 51 yr (1,979 cases) for women. The mortality from cholecystectomy was 23 patients (average age, 66 yr). In contrast to papillectomy and ductal revision, the cause of mortality in these patients was associated with advanced age and involved cardiovascular, pulmonary, or renal complications; mortality was only 0.4% in the group under 40 yr. The experience highlights the importance of early, low risk cholecystectomy.

6796 SUSCEPTIBILITY OF THE LIVER AND BILIARY TRACT TO ANAEROBIC INFECTION IN EXTRAHEPATIC BILIARY TRACT OBSTRUCTION. III. POSSIBLE SYNERGISTIC EFFECT BETWEEN ANAEROBIC AND AEROBIC BACTERIA. AN EXPERIMENTAL STUDY IN RABBITS. (Eng.) Nielsen, M. L.; Justesen, T.; Asnaes, S. (31 Sofievej, DK-2900 Hellerup, Denmark). *Scand. J. Gastroenterol.* 11(3):263-272; 1976.

The pathogenicity of single anaerobic, single aerobic, and mixed anaerobic and aerobic bacterial inocula was studied in three groups of 12 rabbits with experimentally induced biliary tract obstruction. *Bacillus fragilis, ss. fragilis,* and *Escherichia coli* serotype O1:K1:H7 were used. The investigation was made 7 days after bacterial inoculation, and included bacteriological studies of the liver and bile, as well as studies of liver function and morphology of the liver and biliary tract. The inoculation of 10^5-10^6 *E. coli* did not cause biliary tract infection, liver abscesses, or death. Inoculation of 10^9 *B. fragilis* caused biliary tract infection in 83% and liver abscesses in 17% of the animals inoculated, without any mortality. Combined inoculation with *B. fragilis* and *E. coli* in reduced doses significantly increased mortality (42%) and the frequency of liver abscesses in surviving animals (86%). All abscesses, however, yielded a pure culture of *B. fragilis* only. Eighty-four percent of the animals inoculated with *B. fragilis* alone or with *B. fragilis* in combination with *E. coli* developed biliary tract infection with *B. fragilis*, the bile yielding 10^7-10^9 *B. fragilis* per milliliter, gallbladder bile yielding significantly higher bacterial counts than common duct bile. *E. coli* was never recovered from bile in surviving animals, but from both bile and blood in animals not surviving the experimental period.

6797 PSEUDOLYMPHOMA OF THE GALLBLADDER. (Eng.) Hussain, S. A.; English, W. E.; Lytle, L. H.; Thomas, D. W., Jr. (Lock Haven Hosp., 112 W. Main St., Lock Haven, PA 17745). *Am. J. Gastroenterol.* 65(2):152-155; 1976.

The case of a 78-yr-old woman with pseudolymphoma of the gallbladder is presented. The patient had a 2-yr history of postprandial epigastric distress, "bloating," and retrosternal burining, which were relieved by carbonated drinks and alkalis. The gallbladder was found to be enlarged and nonfunctioning; it contained palpable stones, and a cholecystectomy was performed. The common bile duct functioned normally. The gallbladder contained a polypoid, finely nodular lesion that projected into the lumen of the proximal portion of the body. The lesion was covered by a thin layer of intact mucosa and was composed primarily of lymphocytic elements that tended to separate the smooth muscle fibers. The lymphocytes appeared mature, but varied slightly in size. The histiocytes contained active nuclei, but none had the appearance of Reed-Sternberg cells. Scattered throughout the lymphocytes were small vascular twigs. The pericholecystic lymph node showed hyperplasia, but no evidence of malignancy. The patient made an uneventful recovery. This case fullfilled all the criteria for the diagnosis of pseudolymphoma, except that giant cells were not observed. This is apparently the first reported case of pseudolymphoma of the gallbladder.

6798 CHOLECYSTOSTOMY HAZARD IN ACUTE CHOLANGITIS. (Eng.) Saik, R. P.; Greenburg, A. G.; Peskin, G. W. (Veterans Admin. Hosp., 3350 La Jolla Village Drive, San Diego, CA 92161). *JAMA* 235(22):2412-2413; 1976.

The cases of four patients with acute cholangitis, all of whom died following cholecystostomy or cholecystoduodenostomy, are presented. The first patient, a 50-yr-old man, had had a portacaval shunt for cirrhosis and variceal hemorrhage. The second, an 87-yr-old man, had had gastrectomy for peptic ulcer disease and had been treated for coronary artery disease. The third, an 83-yr-old man, had chronic pancreatitis. The fourth patient, a 69-yr-old man, had alcoholic cirrhosis and pulmonary tuberculosis and had had a gastrectomy. All patients were diagnosed as having acute cholecystitis, and cholecystostomy or cholecystoduodenostomy was performed instead of cholecystectomy. After the procedure, bile cultures were positive for bacteria; *Klebsiella* was found in three patients, *Escherichia coli* in three, *Staphylococcus aureus* in one, *Proteus* in two, and *Pseudomonas* in one. Despite extensive antibiotic treatment, all patients died in septic shock. Although cholecystostomy remains an adjunct for the treatment of severe acute cholecystitis, it is an inadequate method of drainage of the common duct, unless cystic duct patency can be verified. Immediate reoperation, rather than antibiotic manipulation, to establish common duct drainage in patients who do not respond to cholecystostomy within 24 hr is advised.

6799 VALUE OF EARLY OPERATION FOR CHOLELITHIASIS.

(Ger.) van der Linden, W. (Chirurgische Klinik, Centrallasarettet, S-83101 Ostersund, Sweden). *Internist (Berlin)* 16(12):571-574; 1975.

The risks associated with gallstones, the indications for early surgery in uncomplicated cases, the question of early or delayed intervention in acute cholecystitis, and the decision for cholecystostomy or cholecystectomy are reviewed. Surgery for cholelithiasis is considered mandatory, and the indications for it are no less compelling in patients with small stones than in those with single large ones. The question of early intervention in uncomplicated cases remains open, since some affected patients remain without complications for a lifetime; similarly, the question of geriatric intervention remains controversial. The inferential limit is that the surgery is simpler, and the risks smaller, for surgery in the early stages. The problem of operating during acute cholecystitis or waiting until the acute phase has passed has been explored in only one methodologically sound study; it concluded that early surgery was preferable to conservative management. Cholecystostomy, although technically easier than cholecystectomy, has a higher mortality and can require subsequent cholecystectomy; few patients remain symptom-free after cholecystostomy. The author believes that cholecystostomy should be considered only in emergencies and should otherwise be avoided.

6800 TOLERABLE TRANSAMINASE LEVELS IN CHENODEOXYCHOLIC ACID THERAPY.

(Ger.) Krille, G. (Hamburger Strasse 164, 2000 Hamburg 76, W. Germany). *Med. Welt* 27(11):546-547; 1976.

The problem of tolerable elevations in transaminases and exacerbated cholestasis, which are sequelae of chenodeoxycholic acid (CDA) litholysis, is explored and a case history is presented. An inoperable 66-yr-old man with stones, gallbladder hydrops, gastric polyps, hepatomegaly, and cholangic tides with cholestatic hepatitis received an initial dose of 1,500 mg/day CDA, with subsequent administration of 750 mg/day (250 mg mornings, 500 mg evenings). Both doses elicited diarrhea, but enzyme levels remained normal. Three months after the onset of CDA, the patient experienced epigastric pain and increasing gallbladder hydrops. Ten days later, after uninterrupted CDA, five stones were passed. All clinical and laboratory signs were subsequently normalized. After 3 months, the transaminase, γ-glutamyl peptidase, and bilirubin levels increased, and epigastric discomfort recurred. All were reduced with the passing of a sixth stone. Elevated transaminase is not a reason to interrupt CDA litholysis; CDA and CDA-induced lithocholic acid are not hepatotoxic.

6801 ISOENZYMES OF ALANINARYLAMIDASE AND GAMMA-GLUTAMYL-TRANSPEPTIDASE IN INTRAHEPATIC AND EXTRAHEPATIC CHOLESTASIS.

(Ger.) Bornschein, W. (Klinikum rechts der Isar, Technische Universitat Munchen, 8 Munich 80, Ismaninger Strasse 22, W. Germany). *Med. Klin.* 70(21):950-953; 1975.

The role of alanine arylamidase (AA) and gamma-glutamyl transpeptidase (GGT) isoenzyme quotients in the differential diagnosis of extra- or intrahepatic cholestasis was studied in 43 patients by gel electrophoresis. The sera of 24 patients with extrahepatic cholestasis (EHC) was compared with that from 19 patients with intrahepatic cholestasis (IHC). Two GGT bands were seen, one in the albumin alpha-1 region (ISO-1) which forms a weak second anodic band, and one in the alpha-2 region (ISO-2) in healthy subjects. Augmentation of the slowly migrating fraction (beta-globulin region) occurred in both cholestases. A third band was formed in cases of icterus and malignancy with prominent cholestases. The average total serum AA level was higher in EHC than in IHC. ISO-2 of AA is higher in EHC than in IHC, and it increases about equally in both IHC and EHC. The average total serum GGT is significantly higher in EHC than IHC. ISO-2 of GGT is higher in EHC than IHC. In EHC, 19 of 24 cases were of tumors of the bile ducts and head of the pancreas. The group with tumors and cholestasis (independent of localization) was significantly differentiable from the group with benign cholestases (also independent of localization). The role of isoenzyme values in the differential diagnosis of EHC and IHC probably depends upon whether or not EHC is caused by tumor formation. A tumor or cholestasis isoenzyme could lead to a high ISO-2 fraction of AA and GGT.

6802 DIAGNOSTIC PROBLEMS OF COMMON BILE DUCT CYSTS IN CHILDREN.

(Ger.) Gudowski, G.; Reuter, G. (Stadt. Klinikum Berlin-Buch, 1115 Berlin-Buch, Karower Strasse 11, E. Germany). *Kinderaerztl. Prax.* 43(12):545-549; 1975.

Two case histories of idiopathic choledochus cysts are presented, and the literature of cystic management is reviewed. A 1.5-yr-old girl with an unremarkable family history presented with transient episodes of dyspepsia, hepatosplenomegaly, elevated α_2 and β globulins, and depressed gammaglobulin from the second postnatal month. Chronic active hepatitis was refractory to prednisone, azathioprine, and D-penicillinamine. At 1.5 yr, increased bilirubin, alkaline phosphatase, and cholesterol with scintigraphic evidence of obstructive disease led to laparotomy. The cysts nearly filled the entire peritoneal space, with gross displacement of the viscera. A 2.5-cm, stenosed residue of the choledochus extended from cyst to the duodenum. Cholecystectomy, with resection of the cystic area as far as the opening of both hepatic ducts, and anastomosis of the cystic residue in the duodenum were performed. Recovery was uneventful. A 5-yr-old girl, who had infectious hepatitis at 1-2 yr, presented with severe right epigastric pain. All hepatobiliary and gastrointestinal studies were negative. Laparotomy found a bile-filled cyst in the bile duct region, with duodenal and adjacent tissue adhesions. A choledochoduodenostomy was performed, and the patient's recovery was uneventful. Idiopathic choledochus cyst is a sex-linked, congenital dilation of the common bile duct. The triad, epigastric tumor, icterus, and abdominal pains are pathognomic for idiopathic choledochus cysts; the therapy is always surgery.

6803 CLINICAL OBSERVATIONS ON THE BILIARY SYSTEM IN CYSTIC FIBROSIS. (Eng.) Isenberg, J. N.; L'Heureux, P. R.; Warwick, W. J.; Sharp. H. L. (Univ. Minnesota Sch. Medicine, Minneapolis, MN 55455). *Am. J. Gastroenterol.* 65(2):134-141; 1976.

Roentgenographic abnormalities of the extrahepatic biliary tree and the lack of correlation with intrahepatic biliary fibrosis were studied in 66 cystic fibrosis patients. Serum gamma glutamyl transpeptidase (GGT) levels were also studied. Each patient was given a single dose of iopanoic acid (.15 g/kg) on 2 consecutive days, and an AP roentgenogram was taken. If visualization was not achieved, the patient was immediately infused with iodipamide (0.5 cm^3/kg), and roentgenograms of the right upper quadrant were taken at 20-min intervals. Percutaneous liver biopsies were performed in 56 patients, and serum was taken from 61 and assayed for GGT activity. A total of 70 cholecystographic evaluations were made. Of the 66 patients, the gallbladder was not visualized in 22 after oral contrast, and i.v. cholangiography had to be used. Six of the 22 (27.3%) had anatomically normal gallbladders. Of the remaining 16, visualization was achieved in 8, and demonstrated microgallbladder, structural abnormalities, and calculi were demonstrated in 5, 2, and 1, resp. No visualization was achieved in eight patients. In contrast, there were only eight anatomically abnormal gallbladders in the 44 patients given successful oral cholecystography. Of the biopsies, only 22 (39.3%) showed no pathology. Twenty-one (37.5%) showed changes in the portal triads, indicative of multifocal biliary cirrhosis, and 10 of these had abnormal cholangiograms (47.6%). Thirteen specimens (23.2%) showed mild to severe fatty changes. Of the 22 patients with normal biopsies, 7 had abnormal gallbladders (31.8%). Focal biliary pathology occurred in 11 of 23 men biopsied (47.8%), and in 10 of 33 women (30.3%). Women had fatty metamorphosis more often (30.3%) than did the men (13%). Of the 61 patients tested for GGT, 52 also had biopsies taken. Only 13 of the biopsy-proven patients with multifocal biliary cirrhosis had elevations of serum GGT (65%). GGT levels were also elevated in 3 of 11 patients with fatty changes in whom enzyme levels were measured. Seven of the 9 women with multifocal biliary cirrhosis had elevated levels (77.8%), compared to only 6 of 11 men (54.5%). It is concluded that liver biopsy is preferred to serum GGT levels in determining whether a cystic fibrosis patient is developing focal biliary cirrhosis.

6804 CHOLECYSTOENTERIC FISTULAS: SIGNIFICANCE AND RADIOGRAPHIC DIAGNOSIS. (Eng.) Balthazar, E. J.; Gurkin, S. (New York Medical Coll., 1901 First Ave., New York, NY 10029). *Am. J. Gastroenterol.* 65(2):168-173; 1976.

The etiology and pathogenesis of cholecystoenteric fistulas occurring in 12 patients without small bowel obstruction are reviewed. Gallbladder fistulas can be divided into two groups: acute and transitory fistulas associated with obstruction of the cystic duct are seen in patients with typical episodes of acute cholecystitis. Most of these fistulas disappear rapidly *in vivo*. Chronic, functioning, and permanent fistulas are detected in patients with minimal or unrelated symptoms and are accompanied by common duct obstruction. Six case reports are presented, two of which illustrate the two respective types of fistula. In the first patient, a 61-yr-old man who had undergone abdominoperineal resection for rectal carcinoma, an initial upper gastrointestinal examination showed a large extrinsic mass compressing the duodenum, representing a distended gallbladder. After the patients' symptoms (right upper quadrant pain and fever) subsided, a follow-up examination demonstrated a small, almost closed fistulous tract. Upper gastrointestinal examination in the second patient, a 69-yr-old woman, who had been operated on for a gallstone ileus 6 yr previously, revealed a cholecystoduodenal fistula, visualized with a contracted gallbladder. Failure of healing with permanent maintenance of such a communication suggested the presence of a functioning fistula associated with obstruction of the common duct. In all 12 cases, p.o. or i.v. cholangiograms failed to visualize the gallbladder; this may be explained by the fact that bile flows directly through the fistulous tract into the duodenum, making the gallbladder unable to retain contrast material.

6805 STRATIFICATION OF BILE IN GALLBLADDER AND GALLSTONE FORMATION. (Eng.) Nakayama, F.; van der Linden, W. (Kyushu Univ. Faculty Medicine, Fukuoka, Japan). *Surg. Gynecol. Obstet.* 141(4): 587-590; 1975.

Methods to express the state of cholesterol saturation in bile, including triangular coordinate plotting, lithogenic index, and cholesterol saturation index, were used to assess the significance of stratified layers of bile present in the gallbladder in gallstone formation. Bile samples were aspirated from 11 patients during surgery for uncomplicated gallstone disease from the upper, middle, and lower layers of the gallbladder. In five of the patients, the most concentrated bile was in the lower layer (corresponding to the infundibulum). In five, the middle layer (corpus) contained the most concentrated bile. In one patient, the upper layer (fundus) contained the most concentrated bile. The mean lithogenic index went from 1.01 for the least concentrated layer to 0.96 for the most concentrated layer. The mean cholesterol saturation index went from 131.7 in the least concentrated layer to 123.1 in the most concentrated layer. The relative deoxycholic acid concentration went from a mean of 24.1 to 26.0 in the least and most concentrated layers, resp. The concentrating ability of the gallbladder differed for each bile constituent, bile salts being the most concentrated, followed by phospholipids and cholesterol. It is suggested that the gallbladder has a selective absorption process.

6806 HEPATIC MEGACHOLEDOCHUS WITHOUT OBSTRUCTION. (Fre.) Salembier, Y. (69, rue de la Louviere, 59000 Lille, France). *Lille Med.* 20(9):811-813; 1975.

An enlarged hepatic bile duct (megacholedochus) without any evidence of blockage or odditis appears to be a rare condition (0.16% of surgical cases), probably of congenital origin. Eleven cases are reported (9 women and 2 men; average age, 57 yr), 10 of whom had an associated lithiasis of the gallbladder. In five cases, the dilation of the duct was disclosed by x-ray prior to operation. The gallbladder contained a single stone the size of a pea in five instances, and in the other instances, the stones were multiple. A cholecystectomy was performed on all 11 patients; in 6 cases, a transcystic drain was left in place thereby confirming the diagnosis of an absence of obstruction. In one case, a choledochojejunostomy was performed. Of the 11 cases, 8 were diagnosed definitely as unobstructed hepatic duct dilation (hepatic bile duct uniformly dilated to at least 15 mm and no stones present in duct, nondilated gallbladder preventing passage of calculi, bile duct pressure normal or low, and cholangiography revealing homogeneity of contrast medium and rapid passage of medium into duodenum associated with a normal sphincter without intrahepatic reflux) and 3 cases were probable (slightly enlarged gallbladder but not enough to allow passage of calculi, no sign of odditis, and low bile duct pressure). The diagnosis must be differentiated from an odditis, which is characterized by high bile duct pressure, and, usually, less dilation of the duct.

6807 SPONTANEOUS RUPTURE OF THE COMMON BILE DUCT. (Eng.) Spira, I. A. (Beth Israel Medical Center, 10 Nathan D. Perlman Place, New York, NY 10003). *Ann. Surg.* 183(4):433-435; 1976.

The rare case of a patient with spontaneous rupture of the common bile duct is presented. The patient, a 59-yr-old man, had been hospitalized for the treatment of a left-sided pneumothorax. The recurrence of pneumothorax following treatment with an intercostal chest tube and the failure of the lung to fully reexpand after the recurrence necessitated a left thoracotomy and a left upper lobectomy. When the patient had initially presented with symptoms of pneumothorax, the liver was found to be firm and palpable. After the thoracotomy, the patient's liver function tests were abnormal, and he became jaundiced. On the 15th postoperative day, he experienced severe abdominal pain associated with vomiting. At laparotomy, a large amount of free bile was present in the peritoneal cavity. The gallbladder was collapsed, and at the junction of the cyctic duct with the common hepatic duct there was a ragged perforation in the common bile duct about 0.5 cm in diameter. Histologic examination of the edge of the perforation revealed the loss of epithelium and evidence of acute and chronic inflammation. After the insertion of a T-tube into the common duct and lavage of the peritoneal cavity with saline, the patient's condition improved. At a second laparotomy, a 3.5-cm villous tumor was found on the medial duodenal wall overlying the ampulla of Vater. The tumor was excised, a cholecystectomy was performed, and a Roux-en-Y choledochojejunostomy was created. Three small calculi were found in the gallbladder. The patient made an uneventful recovery. Histological examination of the tumor revealed the typical appearance of villous adenoma at the periphery, but the central portion showed invasive adenocarcinoma. The authors conclude that three factors were responsible for the rupture of the common bile duct: the raised intraductal pressure due to the tumor at the distal end, the presence of gallstones, and the presence of inflammation.

6808 SPHINCTEROTOMY OF ODDI'S SPHINCTER: REPORT OF 250 CASES. (Fre.) Lataste, J.; Guegan, Y. (Hopital Intercommunal de Creteil, Creteil, France). *J. Chir. (Paris)* 108(4):307-320; 1974.

Data on a series of 250 sphincterotomies (184 women and 66 men; average age, 56 yr) are reported. The sphincterotomy was the primary surgery in 196 cases and secondary to another biliary or pancreatic procedure in 54 cases. In 164 cases, the sphincterotomy was necessary because of stenosis of the sphincter of Oddi, blocking calculi, or a blocked Wirsung canal. The procedure was elective in 111 cases to remove calculi or bile sediment remaining after choledochotomy, to explore the lower bile duct in cases where diagnosis was uncertain, or to ensure complete drainage of biliary or pancreatic ducts. In the remaining 29 cases, the sphincterotomy was considered to be a safety measure to improve biliary drainage when ducts appeared normal or a repeat surgical intervention for residual common bile duct pathology. Acute pancreatitis resulted in death of 4/17 patients with intra-abdominal complications. There were 19 cases of general complications such as cardiovascular accidents or thromboembolisms; death resulted in 9 cases. Late complications occurred in 19 patients including 7 cases of cholangitis, 4 of which were not due to obstruction. Since atonic stasis in the common bile duct plays a major role in late complications, a gastro-biliary anastomosis is recommended when bile duct is dilated and atonic. Over-all late results were judged as good to excellent, 61.2%; passable or poor, 11.2%; and deaths, 8.8%. In a series of 200 choledochoduodenostomies, over-all results were more favorable. The indications for sphincterotomy should be clearly defined before surgery.

6809 THE PATHOLOGY OF THE INFUNDIBULUM OF THE SPHINCTER OF ODDI. (Fre.) Yvergneaux, J. P.; Bauwens, E.; Yvergneaux, E.; Barraya, L.; Pujol-Soler, R. (Service de Chirurgie a Gand, Universite de Gand, Belgium). *Acta Gastroenterol. Belg.* 38(3/4):137-155; 1975.

Disorders of the infundibulum of the sphincter of Oddi (the muscular canal between the upper sphincter and the papilla) identified by radiomanometric and cholangiographic studies of 1151 patients undergoing surgery are described. Except for a small carcinoma clearly originating in the infundibulum, all cases of malignant lesions were excluded from the study. In several instances, postoperative follow-up was accomplished using cinematography or seriography. The studies indicate that the presence of calculi in the infundibulum without adjacent papillary pathology (calculi and benign stenosis of the sphincter of Oddi) did not alter manometric measurements in the common bile duct. It is observed that the papilla is a strong sphincter whereas the infundibulum has remarkable plasticity. The radiomanometric studies revealed alterations in the consistency of the bile or the presence of blood in the infundibulum. Usually, a chronic obstacle such as calculi or stenosis was responsible for bile stasis; however, infrequently (1.5%), the altered bile or blood was the result of the emptying of a cholecyst or gangrenous cholecystitis. Diverticuli and benign tumors of the infundibulum and papilla are described and discussed. Careful study of the anatomy and pathology of the sphincter of Oddi can prevent needless duodenotomies, sphincterotomies, or reintervention for residual or recurrent calculi.

6810 CLINICAL AND RADIOLOGICAL FEATURES OF ABERRANT INSERTION OF THE COMMON BILE DUCT. (Eng.) Rose, P. G. (Univ. Hosp. Group, Newcastle upon Tyne, England). *Clin. Radiol.* 26(1):121-127; 1975.

6811 GRAM STAIN ON BILE ASPIRATED AT OPERATION: A RATIONAL APPROACH TO ANTIBIOTIC THERAPY IN BILIARY DISEASE [Abstract]. (Eng.) Bishop, H. M.; Keighley, M. R. B.; Crapp, A. R.; Burdon, D. W.; Slaney, G.; Alexander-Williams, J. (General and Queen Elizabeth Hosp., Birmingham, England). *Gut* 16(10):841: 1975.

6812 NONOPACIFICATION OF THE GALLBLADDER AND BILE DUCTS. A PREVIOUSLY UNREPORTED CAUSE. (Eng.) Mujahed, Z. (New York Hosp.-Cornell Medical Center, New York, NY). *Radiology* 112(2): 297-298; 1974.

6813 THE EFFECTS OF GLYCYRRHIZIN ON CHOLECYSTOGRAPHY AND ON THE BILE EXCRETION. (Eng.) Ayabe, K.; Kuratomi, A.; Tani, M. (Saiseikai Yahata Hosp., Kitakyushu, Japan). *Fukuoka Acta Med.* 65(4):193-204; 1974.

6814 THE FATE OF THE ORALLY ADMINISTERED BILE ACID SEQUESTRANT, POLIDEXIDE, IN HUMANS. (Eng.) Simons, L. A. (St. Vincent's Hosp., N.S. W., Australia). *Clin. Exp. Pharmacol. Physiol.* 3(1):99-101; 1976.

6815 ENDOSCOPIC ELECTROSURGICAL CHOLEDOCHOLITHOTOMY: REPORT OF A CASE. (Eng.) Sivak, M. V., Jr.; Farmer, R. G.; Sullivan, B. H., Jr.; Esselstyn, C. B., Jr. (Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, OH 44106). *Gastrointest. Endosc.* 22(2):97-99; 1975.

6816 HEMOBILIA AND PANCREATITIS AS COMPLICATIONS OF A PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAM. (Eng.) Redman, H. C.; Joseph, R. R. (Wayne County General Hosp., Eloise, MI). *Am. J. Dig. Dis.* 20(7):691-698; 1975.

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GENERAL

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The case of a 65-yr-old woman, in whom a bleeding gastric metastasis from a breast carcinoma was successfully removed with a high-frequency diathermy loop passed through a fibroscope, is presented. The patient presented with melena. Seven years previously, a left radical mastectomy had been performed for carcinoma, and 1 yr prior to admission, metastases were detected in the lungs and bones. An upper gastrointestinal series revealed a single filling defect in the fundus. A double contrast x-ray examination of the stomach showed a typical "target" appearance of the ulcerated lesion; this was confirmed by an endoscopy. Emergency gastroscopy was performed because of massive hematemesis. A high-frequency diathermy loop was passed through the panendoscope and placed around the tumor. The base of the lesion was easily transected, and all bleeding stopped. The resected portion of the lesion was then sucked against the tip of the endoscope and removed. Histological examination revealed a poorly differentiated glandular carcinoma, forming irregular, small acini. The superficial glandular epithelium was normal. Electrocauterization in the emergency treatment of patients bleeding from an ulcerated tumor can prevent the risks of abdominal surgery and allow prolonged survival.

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GENERAL

Parasitology

6874 THE LYMPHOKINE EOSINOPHIL STIMULATION PROMOTER AND HUMAN Schistosomiasis mansoni. (Eng.) Kazura, J. W.; Mahmoud, A. A. F.; Karb, K. S.; Warren, K. S. (Dept. Medicine, Case Western Reserve Univ., Cleveland, OH 44106). *J. Infect. Dis.* 132(6):702-706; 1975.

An *in vitro* assay for a lymphokine eosinophil stimulation promoter (ESP) is described in terms of its potential for the diagnosis of *Schistosomiasis mansoni*. Peripheral eosinophils from seven patients with *S. mansoni* infection were specifically induced to migrate on incubation with soluble egg antigen (SEA) in concentrations ranging from 0.1-10 µg, with the peak effect occurring with 10 µg of SEA. SEA had no effect on eosinophils from four individuals without schistosomiasis. Incubation of purified human peripheral lymphocytes from eight *S. mansoni* patients with SEA resulted in the secretion of ESP, which enhanced the migration of purified eosinophils from patients with or without infection. Lymphocytes from four normal controls did not produce ESP when incubated with SEA. This *in vitro* assay may provide a useful tool for the diagnosis of *S. mansoni* infection. The reliability and reproducibility of the ESP assay makes it a useful *in vitro* correlate of delayed hypersensitivity that can be performed easily with human target cells.

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A technique for obtaining viable lymphocytes from human intestinal mucosa was developed to characterize the kinetics of DNA synthesis in the mucosal lymphocytes of the normal and diseased intestine. Single cell suspensions of lymphocytes were derived from the small intestinal mucosa of nine patients with Crohn's disease and from four control patients with normal mucosa, and short-term cultures were established. Cells were separated from mucus by shaking in a vortex mixer, followed by centrifugation at 1,500 rpm for 5 min. The supernatant was removed, and cells and the remaining mucus were resuspended in medium; the process was repeated (4-6 times) until all mucus was dissipated. The cell button was resuspended in medium (RPMI 1640 containing 3% bovine serum albumin), and the cell suspension was passed through siliconized glass bead columns. In comparison to controls, high rates of DNA synthesis were found in 72-hr cultures of the mucosal lymphocytes from all but one patient with Crohn's disease. These rates correlated with the appearance of numerous transformed blast cells in terminated cultures. Lymphocytes from normal and abnormal gut mucosa were stimulated by phytohemagglutinin-P, except in some patients with Crohn's disease with high rates of "spontaneous" DNA synthesis. The isolation and culture of human gut mucosal lymphocytes by a simple preparative technique will enable the direct study of lymphocyte function in both normal and diseased gut mucosa.

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GASTROENTEROLOGY

ABSTRACTS
AND
CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DIESEASES

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED_{50}	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, ul	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

6910 THE EFFECT OF ETHANOL APPLIED DURING GESTATION ON THE MITOCHONDRIA OF THE HEPATIC CELLS OF PUPS. (Eng.) Beskid, M.; Majdecki, T.; Skladzinski, J. (Medical Center Postgraduate Education, ul. Marymoncka 99/103, 01-813 Warsaw, Poland). *Folia Histochem. Cytochem. (Krakow)* 13(3/4):175-180; 1975.

Because previous studies have shown that ethanol causes marked changes in the activities of hepatic oxidative enzymes, the hepatocytic mitochondria of five pups whose mothers had received ethanol throughout the gestation period were examined by electron microscopy. The pregnant dogs had received 250 ml of 25% ethanol in their food twice daily for 20 days (from the first to the last day of gestation). In comparison to controls, mitochondria of the test pups were abnormally elongated, and some assumed monstrous shapes. The abnormal mitochondria contained increased numbers of cristae, which varied in length and arrangement. In addition, the mitochondria of the experimental animals were more densely arranged within the hepatocytes. The parenchymal cells of these animals contained increased numbers of lysosome-like bodies, which occurred in the proximity of the Golgi apparatus. The results indicate that ethanol not only disturbs the metabolism of the hepatocyte mitochondria of animals directly exposed to it, but also that its effects can be transmitted *in utero*.

6911 THE EPITHELIAL SURFACE OF THE MONKEY GASTROINTESTINAL TRACT: A SCANNING ELECTRON-MICROSCOPIC STUDY. (Eng.) Burke, J. A.; Holland, P. (Univ. Kentucky Coll. Medicine, Lexington, KY 40506). *Digestion* 14(1):68-76; 1976.

Scanning electron microscopy was used to investigate the surface topography of individual gastrointestinal cells, the relative distribution of various cell types, and cell orientation of the gastrointestinal tract of six normal monkeys. The surface of the epithelial cells lining the esophagus was characterized by a prominent network of circular and linear cytoplasmic microplications. In contrast, the mucous cells of the stomach were seen to be covered by well-spaced, stub-like microvilli of varying diameters. The surface of the columnar absorptive cells of the small intestine differed from that of the large intestine. Although the absorptive surface of the columnar cells in both segments was covered by microvilli, the colonic microvilli were less abundant, permitting visualization of the entire length of some of the elongated microvillous projections. The epithelial surfaces of Peyer's patches revealed a cell type different from those covering adjacent villi; these M cells were covered by a sparse population of stub-like and finger-like microvilli. Regular repetitious polygonal units demarcated by deep furrows were observed in the colonic mucosa, prepared by air drying from acetone, but not when the mucosa was prepared by critical point drying; this suggests that they appear as a result of tissue shrinkage. The observations allowed the characterization of the surface architecture of the epithelial cells from segment to segment and defined the criteria for the identification of an isolated segment on the basis of cell surface morphology alone.

6912 BIOCHEMICAL AND MORPHOLOGICAL STUDIES ON HUMAN JEJUNAL MUCOSA MAINTAINED IN CULTURE. (Eng.) L'Hirondel, C.; Doe, W. F.; Peters, T. J. (Royal Postgraduate Medical Sch., Du Cane Road, London W12 OHS, England). *Clin. Sci. Mol. Med.* 50(5): 425-429; 1976.

Human jejunal mucosa maintained in culture using a wire-mesh support plus roller-tube technique was studied biochemically and morphologically. Biopsy specimens were taken from 11 control subjects and from 5 patients with untreated celiac disease. During culture, the villi of the normal mucosa tended to be broader and reduced in height, but the appearance of the celiac mucosa was unchanged. Light microscopy of normal specimens showed normal architecture, with some blunting of villi; in the celiac mucosa, there was an absence of villi and the presence of hypercellular crypt regions and nuclear irregularities in the enterocytes. Radioautographs were prepared after incubation with ^{3}H-leucine (2 μCi). The enterocytes showed evidence of intense protein synthesis, but the immunocytes and interstitial cells were labeled less intensely than the epithelial cells. DNA synthesis was studied by incubation of two normal biopsies with 10 μCi ^{3}H-thymidine. Several crypt cells were labeled without any incorporation into the immunocytes or interstitial cells. The tissue protein and DNA contents fell during culture, but the combined tissue and medium DNA content remained constant. This suggests that this parameter may be used as a reference for enzyme and biochemical studies on cultured intestinal biopsies.

6913 CHANGES IN THE ORGANS OF PIGS IN RESPONSE TO FEEDING FOR THE FIRST 24 H AFTER BIRTH. II. THE DIGESTIVE TRACT. (Eng.) Widdowson, E. M.; Colombo, V. E.; Artavanis, C. A. (Dept. Investigative Medicine, Cambridge Univ., Downing Site, Downing St., Cambridge CB2 1QN, England). *Biol. Neonate* 28(5/6): 272-281; 1976.

The response of the gastrointestinal (GI) tract to food during the first 24 hr after birth was investigated in piglets. The piglets were either sacrificed immediately after birth or fed water for 24 hr, suckled for 24 hr, or suckled for 10 days prior to sacrifice. The entire GI tract was removed at once and weighed. In the suckled piglets, the stomach and small and large intestines gained rapidly during the first 24 hr, more so than during the next 9 days. The large intestine gained 40% in weight and 34% in length in 24 hr. The differences in length of both intestines at birth and 24 hr after suckling were statistically significant ($p<0.001$), as were the differences in weight of the small intestine ($p<0.001$). For weight gain of the stomach and large intestine, $p=0.005$ and 0.01, resp. There was also a concurrent significant increase in grams per centimeter of the small intestine ($p<0.001$). The gains in the jejunum and ileum were greater than those in the duodenum. In the jejunum, both muscle and mucosa increased in weight, but the mucosa more than the muscle, and there was an increased amount of protein in it. Some may have been colostral protein in the process of being absorbed. The lactase and acid phosphatase activities in the jejunal mucosa increased during the first 24 hr in suckled animals, but, because of the large increase in the amount of mucosa and of the protein in it, the enzyme activities (per gram of protein) fell. The increased lactase activity during the first 24 hr was in response to food. The results agree with previous ones showing a fall in enzyme activity that passed from the upper to the middle and lower third of the jejunum in unsuckled newborn animals, but no such fall at 10 days.

6914 ISOLATION OF BILE DUCTS FROM RAT LIVER: TECHNIQUE AND PRELIMINARY ULTRASTRUCTURAL CHARACTERIZATION.

(Eng.) Oda, M.; Yousef, I. M.; Phillips, M. J. (Dept. Pathology, Toronto General Hosp., Toronto, Ontario, M5G 1L5, Canada). *Exp. Mol. Pathol.* 23(2):214-219; 1975.

A bile duct-containing fraction was isolated from the liver of male Wistar rats, and a preliminary electron microscopic characterization was made using conventional (glutaraldehyde and osmium tetroxide) and ruthenium red (RR) staining techniques. For comparison, the livers from five rats were stained *in vivo*, i.e., the liver was perfused with RR stain via a catheter inserted into the portal vein. The conventional stain showed that the bile duct pellet isolated from the liver homogenates contained a large number of intact bile ducts, but that the contaminating components of the pellet were disintegrated and fragmented. The bile ducts were formed by four or more biliary epithelial cells situated around a central lumen and surrounded by a basement membrane. The cell membranes were intact, and the luminal surface was covered with microvilli. A granular cytoplasmic deposit was found and, frequently, an intact basement membrane surrounded the bile ducts. In the RR-stained *in vivo* preparations, the fine structure of the bile ducts was similar to that seen with the conventionally stained *in vitro* preparations. The stain did not penetrate the basement membrane around the bile ducts, and no staining of the biliary epithelial occurred. In the isolated RR preparations, there were similar findings; in partially disrupted ducts, RR entered the biliary cells and clearly demonstrated the surface coat on the luminal surface of biliary epithelial cells, including the surface of microvilli. Sharp visualization of intracellular microfilaments was also obtained. The dense RR-positive microfilamentous network corresponded to the diffuse granular material observed with the conventional stain.

6915 THE INFLUENCE OF HISTAMINE ON EPITHELIAL CELL PROLIFERATION IN THE JEJUNUM OF THE RAT.

(Eng.) Tutton, P. J. M. (Dept. Anatomy, Monash Univ., Clayton, 3168, Victoria, Australia). *Clin. Exp. Pharmacol. Physiol.* 3(4):369-373; 1976.

The influence of small doses of histamine and histamine H_1- and H_2-receptor blockage, and of histamine depletion on the proliferation of jejunal epithelial cells was studied in male Sprague-Dawley rats. Mitotic rates were measured in the bases of the crypts of Lieberkuhn over a 4-hr period after an i.p. injection of 0.1 mg/kg histamine acid phosphate. Four rats were treated with the histamine H_1-receptor blocking agent, mepyramine (2.5 mg/kg) and histamine, and four others were treated with the histamine H_2-receptor blocking agent, metiamide (0.5 mg/kg) and histamine. Six rats received 200 mg/kg DL-α-methylhistidine dihydrochloride at 0800 and 1200 hr, which caused a rapid depletion of tissue stores of histamine. Tissue for a mitotic rate study was taken at 1200-1600 hr. The control mitotic rate in the crypts was 0.49 mitoses/cell/hr. In rats treated with histamine alone, the mitotic rate was 0.079 mitoses/cell/hr, a significantly higher value ($p<0.001$). The rats given mepyramine and histamine had a mitotic rate of 0.085 mitoses/cell/hr. In rats given metiamide and histamine, the mitotic rate was 0.045 mitoses/cell/hr, significantly lower than that in rats given histamine alone ($p<0.05$), and not significantly different from control values. In the rats in which endogenous histamine synthesis was blocked, the rate was 0.043 mitoses/cell/hr. The results suggest that proliferation of epithelial cells in the crypts of Lieberkuhn in rats can be stimulated by histamine and that histamine exerts its influence as an H_2-receptor.

6916 THE FINE STRUCTURE AND LOCALIZATION OF ALKALINE PHOSPHATASE ACTIVITY OF THE SMALL INTESTINAL EPITHELIUM IN THE POSTNATAL DEVELOPING RAT.

(Eng.) Ono, K. (Dept. Anatomy, Sch. Medicine, Iwate Medical Univ., Morioka 020, Japan). *Acta Histochem.* 52:117-133; 1975.

The morphological structure of and the development of alkaline phosphatase (AP) activity in the small intestine of newborn rats were investigated by light and electron microscopy. Electron microscopy showed the presence of apical small vacuoles and tubules, with a well-developed microvillous border, in the duodenum on the day of birth. The cytological features of the jejunal epithelium were similar. In the ileum of 5-day-old-rats, 49% of the small intestine contained cells with a supranuclear vacuole. This figure dropped to 25% at 15 days, and in a 23-day specimen, there were no cells containing a supranuclear vacuole, apical vacuoles, or tubules. AP activity of the duodenal and jejunal epithelial cells was observed on the microvilli, apical vacuoles and tubules, and the tubular invagination until the 14th day. After the 15th day, the enzyme activity was localized on the microvillous membrane. This cytochemical pattern in the jejunum showed no change with age. Around the 23rd day, AP activity of the duodenal epithelium was observed in the same sites as those in the full-grown rat; i.e., on the microvilli, the lateral cell membrane, and the Golgi apparatus. During suckling, AP activity in the ileal cells was seen in the microvillous membrane, lateral cell membrane, apical tubulovacuolar system, and the supranuclear vacuole. At weaning however, the last two structures disappear, and all absorptive cells in the epithelium are free of reaction products as in the adult rat. The total amount of AP is higher in the ileal epithelium than the jejunal epithelium. The results show that the tubulovacuolar system and the supranuclear vacuole are important cytological features of protein absorption in the small intestinal epithelium during suckling.

6917 REGULAR STRUCTURES IN UNIT MEMBRANES. III. FURTHER OBSERVATIONS ON THE PARTICULATE COMPONENT OF THE SUCKLING RAT ILEUM ENDOCYTIC MEMBRANE COMPLEX. (Eng.) Robertson, J. D.; Knutton, S.; Limbrick, A. R.; Jakoi, E. R.; Zampighi, G. (Dept. Anatomy, Duke Univ. Sch. Medicine, Durham, NC 27710). *J. Cell Biol.* 70(1):112-122; 1976.

The morphology of the particles decorating the lumenal surfaces of membranes of the endocytic complex of the epithelial cells from the suckling rat ileum is described. The particles each measure about 7.5 nm across and look like the capital letter H in frontal view. They consist of n-acetyl-β-glucosaminidase (NAG), and they are arranged in rows, with the symmetrical lateral bars spaced about 14.5 nm apart. A purified preparation of these membranes was studied by electron microscopy using thin sectioning, negative stain, Markham translation, and optical-diffraction computer-image-reconstruction methods. The individual particles can be seen in profile when dried in a pool of negative stain. They appear either triangular or diamond-shaped. If triangular, they appear to consist of three domains at the corners of an equilateral triangle, one side of which is parallel to the membrane surface but separated from it by a dense band of negative stain about 2 nm thick that runs along the membrane surface. A fourth domain is sometimes visible within this dense band, giving a diamond-shaped figure. This fourth domain connects the particle to the membrane. Thus, each H-shaped particle is a double structure, with each half looking like a diamond in profile. Each H-shaped particle is believed to consist of either two or four molecules of NAG. NAG is now sufficiently characterized to allow it to be singled out from other enzymes and identified in negatively stained preparations.

6918 PROLIFERATIVE CAPABILITY OF PARIETAL AND ZYMOGEN CELLS. (Eng.) Chen, K. Y.; Withers, H. R. (Dept. Medical Res., Natl. Defense Medical Center, Veterans General Hosp., Taipei, Taiwan, Republic of China). *J. Anat.* 120(3):421-432; 1975.

The proliferative capability of parietal and zymogen cells was investigated in 6- to 8-week-old male C3Hf/Bu mice. The mice were killed and studied from 30 min to 30 days after i.p. injection of ^{3}H-thymidine (50 μCi/mouse). Labeling of parietal and zymogen cells was observed in autoradiographic histological specimens. There were 590 ± 22 gastric glands per circumference at the body of the stomach. The number of parietal cells was 16.2 (14.0-18.4) per gland or 9,600 per circumference. There were 11.4 (9.4-13.7) zymogen cells per gland or 6,700 per circumference. Two labeled immature parietal cells per circumference were seen 30 min after injection, equivalent to a ratio of 1:5,000; more mature labeled cells were seen later, at times up to 30 days. There was evidence for proliferation during maturation and downward migration of these cells toward the body and the lower part of the gastric gland. An average of 2.6 zymogen cells per circumference, or 1:2,500, was labeled. Although most zymogen cells were not proliferating, cells entered the proliferating cycle at random. The data support earlier evidence that immature parietal cells constantly supply mature parietal cells through migration from a proliferative zone. Whether the parietal cells are derived from the same stem cell compartment as surface epithelium cells is unclear. Based on these findings and the radiation responses of both parietal and zymogen cells, it is postulated that they form part of a slow renewal system.

6919 ELECTRON MICROSCOPE STUDIES OF EXPERIMENTAL Entamoeba histolytica INFECTION IN THE GUINEA PIG: II. EARLY CELLULAR AND VASCULAR CHANGES ACCOMPANYING INVASION OF THE LAMINA PROPRIA. (Eng.) Takeuchi, A.; Phillips, B. P. (Walter Reed Army Inst. Res., Washington, DC 20012). *Virchows Arch. [Zellpathol.]* 20(1):1-13; 1976.

6920 RHYTHMIC CIRCADIAN ACTIVITY OF THE RAT HEPATIC LOBULE REFLECTED AT CELLULAR LEVEL. (Eng.) Barbarasa, C. (Inst. Hygiene and Public Health, Iassy, Rumania). *Rev. Roum. Morphol. Embryol.* 22(1):33-39; 1976.

6921 STRUCTURAL ASPECTS OF THE MEMBRANE OF THE ENDOPLASMIC RETICULUM. (Eng.) DePierre, J. W.; Dallner, G. (Dept. Biochemistry, Univ. Stockholm, Stockholm, Sweden). *Biochim. Biophys. Acta* 415:411-472; 1975.

6922 ULTRASTRUCTURE OF ENDOCRINE CELLS IN METAPLASTIC EPITHELIUM OF HUMAN GALL BLADDER. (Eng.) Laitio, M.; Nevalainen, T. (Dept. Pathological Anatomy, Univ. Turku, Turku, Finland). *J. Anat.* 120(2):219-225; 1975.

6923 MORPHOLOGICAL CHANGES IN THE RAT PARIETAL CELLS AFTER ANTRECTOMY [Abstract]. (Eng.) Helander, H. F. (Dept. Anatomy, Univ. Umea, Umea, Sweden). *Acta Hepato. Gastroenterol. (Stuttg.)* 23(1):78; 1976.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

6924 HYPERTROPHY OF INTESTINAL SMOOTH MUSCLE.

(Eng.) Gabella, G. (Dept. Anatomy, Univ. Coll. London, Gower St., London, WC1E 6BT, England). *Cell Tiss. Res.* 163(2):199-214; 1975.

See also, 7086, 7246, 7270.

ABSORPTION - EXCRETION - TRANSPORT

6925 NEW CHARACTERISTICS OF HARMALINE INHIBITION OF INTESTINAL TRANSPORT SYSTEMS. (Eng.)

Sepulveda, F. V.; Robinson, J. W. L. (Departement de Chirurgie Experimentale, Hopital Cantonal Universitaire, CH-1011 Lausanne, Switzerland). *Naunyn Schmiedebergs Arch. Pharmacol.* 291(2):201-212; 1975.

The mechanism of harmaline on intestinal transport was investigated *in vivo* in guinea pigs and dogs, and its effect was compared with related psychotomimetic compounds. Rings of guinea pig small intestine were incubated with 1 mM phenylalanine and several concentrations of harmaline. The lowest concentration having a significant inhibitory effect was 0.1 mM. The drug (at 4 mM) inhibited the unidirectional mucosal-to-serosal (M-S) flux of phenylalanine (from around 300 to 35 nmol/cm^2/hr), but only when it was added to the solution bathing the mucosal surface. The M-S flux of Na was similarly reduced. Ion and water absorption in the perfused dog intestine *in vivo* was also diminished by harmaline. The effects of several other psychotropic indole analogs were measured. The actions of harmine and harmalol were similar to that of harmaline, despite their different lipid solubilities. N:N-dimethyltryptamine was equally inhibitory, but serotonin was inactive. Mescaline and lysergic acid diethylamide inhibited phenylalanine transport, but to a much lesser extent than harmaline. These results support the hypothesis of the rapid onset of harmaline inhibition of Na-dependent uptake mechanisms, and they indicate that harmaline interacts with the Na site of nonelectrolyte carrier complexes.

6926 INHIBITION OF INTESTINAL AMINO ACID ABSORPTION BY UNCONJUGATED BILE SALT IN VIVO.

(Eng.) Burke, V.; Gracey, M.; Thomas, J.; Malajczuk, A. (Princess Margaret Children's Medical Res. Foundation, Perth, Western Australia). *Aust. N.Z. J. Med.* 5(5):430-432; 1975.

The possibility that unconjugated bile salts inhibit the absorption of the products of protein digestion was studied *in vivo* in female Wistar rats. The animals were perfused via the proximal jejunum with a solution containing 10 mM unlabeled L-leucine, L-proline, L-lysine, L-glycine or glycyl-glycine or 2.5 mM unlabeled L-tyrosine, with the addition of 0.67 μCi/ml of the appropriate ^{14}C-labeled amino acid. The initial intestinal absorption of the five amino acids (mean=0.61, 0.78, 0.56, 0.70, 0.083, and 2.8 μmol substrate absorbed/cm/hr for L-lysine, L-proline, L-glycine, L-leucine, L-tyrosine, and glycyl-glycine, resp.) was significantly inhibited when 1 mM deoxycholate was added to the perfusion (0.19, 0.59, 0.24, 0.33, 0.039, and 0.8 μmol/cm/hr, resp.). These results are similar to the effect of unconjugated bile salts on intestinal sugar transport. It seems likely that inhibition of the intestinal absorption of amino acids and dipeptides may contribute to the hypoproteinemia associated with bacterial contamination of the upper gut.

6927 INHIBITION OF INTESTINAL ABSORPTION OF L-PHENYLALANINE IN VIVO BY L-ALANINE. (Eng.)

Wapnir, R. A.; Lifshitz, F. (North Shore Univ. Hosp., Manhasset, NY 11030). *Proc. Soc. Exp. Biol. Med.* 152(3):307-311; 1976.

In a search for alternative approaches to the established dietary treatment of phenylketonuria, the mode of action and kinetics of L-alanine (L-Ala) inhibition on L-phenylalanine (L-Phe) intestinal transport was studied in an *in vivo* system. Isolated, 20-cm open segments of the upper jejunum in anesthetized female Wistar rats were used. The absorption rates of L-Phe, when perfused either at 1 or 2 mM, were affected by the simultaneous presence of L-Ala only when the ratio of L-Ala to L-Phe was 10 to 1 or higher. The presence of a 20 to 1 molar ratio decreased the L-Phe absorption rates by 27.8% for a 1 mM perfusate and by 43.7% in a 2 mM L-Phe solution. A V versus V/S plot, where V is the absorption for different concentrations of the substrate L-Phe (S), showed that the inhibition was noncompetitive, and the same conclusion was obtained from a Lineweaver-Burk plot. The mean intestinal absorption rates of 2 mM L-lysine, L-histidine, and L-methionine were also significantly inhibited by 40 mM L-Ala (11.76, 9.16, and 10.23 nmol/min x cm, resp., without L-Ala; 6.92, 4.79, and 8.41 nmol/min x cm, resp., with L-Ala). The same concentration of L-Ala had no effect on the absorption of 2 mM (L-) arginine, leucine, isoleucine, valine, tryptophan, threonine, or typrosine. These results indicate that the common transport mechanism for neutral amino acids is also operative for positively charged amino acids and that the proportion of the translocation load for these substances is based toward the common carrier. The addition of 40 mM galactose alone produced no significant effect on the rate of 2 mM L-Phe absorption; together with 40 mM L-Ala, however, galactose produced an additive effect and a reduction of the absorption rate to 48.8% of the baseline value. The results are consistent with the presence of two active transport mechanisms for neutral amino acids in the intestinal mucosa: a common one that can be blocked by large concentrations of L-Ala and a specific site or carrier that is not affected by this inhibitor.

6928 CONCENTRATION CHANGES OF BILE ACIDS IN SEQUENTIAL SEGMENTS OF PIGEON INTESTINE AND THEIR RELATION TO BILE ACID ABSORPTION.

(Eng.) Spittell, D.; Vongroven, L. K.; Subbiah, M. T. R. (Mayo Clinic, Rochester, MN 55901). *Biochim. Biophys. Acta* 441(1):32-37; 1976.

The concentration of bile acids in contents from sequential intestinal segments of pigeons was measured to determine the absorption site of bile acids. The nature of bile acids in the various segments, and the fecal excretions of bile acids and sterols following bypass surgery, were also studied in pigeons. Chenodeoxycholic acid was the major bile acid in the duodenum, comprising 78.5% of the total bile acids; this level decreased to 52.7%, 30.6%, and 22.7% in the jejunum, ileum, and colon (cloaca), resp. As the concentration of chenodeoxycholate decreased, the concentration of lithocholic and 7-ketolithocholic acids increased. The concentration of total bile acid was increased from the duodenum to the jejunum and decreased from the jejunum to the colon, indicating rapid reabsorption of bile acids through intestinal transit. When the ratio of the concentration of bile acids to that of nonabsorbable β-sitosterol was examined, it was found that the ratio dropped markedly from the upper jejunum to the lower jejunum (90.1%), while the drop in the ratio from the lower jejunum to the ileum was minimal (8.3%). When the fecal excretion of bile acids and neutral sterols in the early period following ileal bypass (1 month) was compared to the rate in sham-operated pigeons, there was no significant change in the fecal excretion of bile acids and neutral sterols. There was a slight increase in the fecal excretion of total sterols in the bypassed birds, but this was far less than that occurring in mammals. These studies show that in birds, the normal jejunum can absorb significant amounts of bile acids. Under conditions of ileal bypass, the jejunum can maintain normal enterohepatic circulation of bile acids.

6929 ACTIONS OF RICINOLEIC ACID AND STRUCTURALLY RELATED FATTY ACIDS ON THE GASTROINTESTINAL TRACT. II. EFFECTS ON WATER AND ELECTROLYTE ABSORPTION IN VITRO.

(Eng.) Gaginella, T. S.; Stewart, J. J.; Olsen, W. A.; Bass, P. (Sch. Pharmacy, Univ. Wisconsin, 425 N. Charter St., Madison, WI 53706). *J. Pharmacol. Exp. Ther.* 195(2):355-361; 1975.

The hydrophoric activity of ricinoleic acid and a series of structurally related fatty acids was investigated using an everted hamster gut sac technique. In the jejunum, a maximal (77%) inhibition of net water absorption was elicited by 2.0 mM ricinoleate, but 8.0 mM ricinelaidate (the *trans* isomer) was required to produce the same effect. Ricinoleate significantly inhibited net sodium ($p<0.001$) and potassium ($p<0.005$) absorption, but ricinelaidate did not affect the absorption of either ion. Net chloride absorption was decreased by both compounds ($p<0.005$ or greater). Concentrations of oleate greater than 2.0 mM produced a significant inhibition in net water absorption, and maximal inhibition (71.16%) occurred at 8.0 mM. The *trans* isomer of oleate was ineffective. Net water, sodium, and chloride absorption were significantly inhibited by 2.0 mM ricinoleyl alcohol; the initial mean level of water absorption was 78 μl/min/g, and this was reduced to 32 μl/min/g. The methyl ester of ricinoleate (2.0 mM) had no observable effect. Net water, sodium, and chloride absorption were significantly reduced by the *cis*, but not the *trans*, isomer of 2.0 mM linoleate. Although 2.0 mM sodium stearate or 9,10-hydroxystearate produced no significant reductions in electrolyte or water absorption, 2.0 mM 12-hydroxystearate caused significant reductions in sodium, chloride, and water transport ($p<0.05$). In the ileum, 2.0 mM ricinoleate and ricinelaidate produced significant ($p<0.005$) reductions in net water absorption. Both oleate and elaidate (both at 2.0 mM) were ineffective in the ileum. At mucosal concentrations of 2.0 mM, the unsaturated fatty acids had the following rank order of potency on the inhibition of water absorption: ricinoleate ≥ ricinelaidate ≥ linoleate oleate > linelaidate >> elaidate. The results define those portions of the ricinoleic acid molecule required for its effect on water and electrolyte absorption and suggest that classification of this cathartic as an "irritant" or "stimulant" should be reevaluated.

6930 TRANSPORT AND CONJUGATION OF ^{14}C-BILIRUBIN DURING ACUTE AND CHRONIC CHOLESTASIS IN THE CHOLECYSTECTOMIZED DOG.

(Eng.) Bergan, A.; Taksdal, S.; Sander, J. (Surgical Dept. B, Rikshospitalet, Univ. Clinic, Oslo, Norway). *Eur. Surg. Res.* 7(6):355-365; 1975.

The role of the lymphatics in the regurgitation of bilirubin during acute and chronic extrahepatic cholestasis in the dog was studied after i.v. injection of ^{14}C-bilirubin (2.87×10^6 to 1.575×10^8 disintegrations/min). In two dogs subjected to acute biliary obstruction, the bilirubin was rapidly removed from the plasma and was deposited in thoracic duct lymph as labeled bilirubin conjugates. These conjugates were found in the lymph 15 min after injection; they increased to reach a maximum after 1 hr. The total and continuous thoracic duct drainage used prohibited any lymph-to-blood recirculations of radioactive bilirubin. No labeled conjugates were at any time demonstrated in plasma, a result of a biliolymphatic regurgitation. In dogs with chronic biliary obstruction, there was an initial rapid fall in the amount of labeled unconjugated bilirubin in the plasma, followed 2 min later by a rapid reappearance of labeled conjugates that reached a maximum in 1 hr. It is suggested that these conjugates were delivered back into the plasma directly, and not by the lymphatic pathway, as during acute cholestasis. Thus, no specific transport function of the lymph was found. These results show a change in liver cell secretory direction in long-standing cholestasis.

6931 EVIDENCE FOR CARRIER-MEDIATED UPTAKE AND EFFLUX OF SUGARS AT THE SEROSAL SIDE OF THE RAT INTESTINAL MUCOSA IN VITRO.

(Eng.) Bronk, J. R.; Ingham, P. A. (Dept. Biology, Univ. York, York YO1 5DD, England). *J. Physiol. (Lond.)* 255(2): 481-495; 1976.

The bidirectional, transintestinal movement of sugars from the serosal surface of the mucosal cell was examined in male Wistar rats using a modification of the relatively intact everted sac preparation before and after treatment with mercuric chloride. Everted jejunal sacs were incubated for 5, 10, and 15 min in a mucosal mixture of 2 mM D-^{3}H-galactose (D-gal) and 2 mM L-^{14}C-glucose (L-glu). The D-gal/L-glu ratio in the mucosal medium at the start of incubation was 1. At 5, 10, and 15 min, however, it was significantly higher in the serosal layer (8.80, 11.45, 10.19, resp.) than in the mucosal layer (6.53, 7.28, 6.89). The D-gal moved out of the mucosal layer in preference to L-glu. The mediated serosal efflux of galactose was inhibited ($p<0.001$) by 0.5 mM phlorizin on the mucosal side and to some extent ($p<0.01$) by any reduction in the mucosal Na$^+$ concentration (from 25 mM). Both inhibited galactose uptake at the brush border. Serosal efflux of the sugar appeared to be saturated at high concentrations of D-gal. Pretreatment of the sacs with 2 mM mercuric chloride considerably reduced D-gal uptake from the mucosal side (from 8.44 mM, control, to 3.28 mM) but did not affect its efflux relative to L-glu at the serosal side. The D-gal/L-glu ratios change as the sugars pass from one compartment to the next, and they are indicative of the selective transport of one sugar in relation to the other.

6932 STUDIES ON THE TRANSPORT OF ALIPHATIC GLUCOSIDES BY HAMSTER SMALL INTESTINE IN VITRO.

(Eng.) Ramaswamy, K.; Bhattacharyya, B. R.; Crane, R. K. (Dept. Physiology, Coll. Medicine and Dentistry of New Jersey, Rutgers Medical Sch., Piscataway, NJ 08854). *Biochim. Biophys. Acta* 433(1):32-38; 1976.

Eight alkyl D-glucosides were tested *in vitro* as substrates for the Na$^+$-dependent glucose transport system of hamster small intestine. These glucosides have alkyl aglycones of various chain lengths, terminated by a methyl group, a hydroxyl group, or a second glucose unit in glycosidic linkage. Homogenates were prepared from everted segments of small intestines from male hamsters. The amount of glucose liberated by hydrolysis was determined by the glucose oxidase method and was taken as a measure of glucoside transport. With decyl glucoside, maximal uptake occurred at 5 min, at which time an apparent tissue/medium ratio of 7.0 was established. The process of uptake was strongly inhibited (57%) by 2,4-dinitrophenol at 1 mM. Dodecyl glucoside strongly inhibited the uptake of β-methyl glucoside with competitive kinetics. As the chain length of the glucosides increased, the uptake continued to diminish to octyl glucoside, increased at decyl glucoside, and then diminished progressively thereafter. Phlorizin totally inhibited the uptake of glucosides with chain lengths from 1 to 8 carbon atoms in the aglycone. With increased aglycone chain length, phlorizin inhibition dropped to the range 40-50% for the decyl, dodecyl, and tetradecyl glucosides. In the absence of Na$^+$, there was almost no uptake for glucosides with chain lengths 1-8. There was a 30-40% reduction of uptake with increased alkyl chain length. The results show that glucosides with a long alkyl chain (2-18 carbon atoms) as the aglycone can be transported by carrier-mediated processes in the hamster small intestine *in vitro.*

6933 EFFECT OF NON-IONIC DETERGENTS ON THE ABSORPTION OF FAT AND α-TOCOPHEROL IN THE RAT.

(Eng.) Sheltawy, M. J.; Losowsky, M. S. (St. Jame's Hosp., Leeds, LS9 7TF, England). *Nutr. Metab.* 18(5/6):265-271; 1975.

Because an earlier study suggested that polyoxyethylene sorbitan monoleate (PSM) reduced the binding capacity of cholestyramine for bile salts, fecal bile salt levels were measured in male Wistar rats fed a 5% cholestyramine diet alone or in combination with 2% PSM or 2% polyoxypropylene polyoxyethylene polymer (PPP) for 7 days. The fat absorption, the absorption rates of radioactive α-tocopherol (1 μCi), and the serum cholesterol levels were also measured in the rats on the different diets. Fecal bile salt levels were significantly increased by including cholestyramine in the diet, from a mean control level of 4.6 mg/day to 21.3 mg/day. This effect was not significantly diminished by including either of the detergents in the diet. The mean level of fat absorption on the control diet (94%) was significantly reduced (55.8%) when cholestyramine was added to the diet. The addition of PSM to this diet did not significantly increase fat absorption, but the addition of PPP markedly increased absorption to 75.4% ($p<0.001$). The mean level of α-tocopherol absorption on the control diet (58.8%) was significantly reduced (21%) when cholestyramine was added, and this was not significantly changed by either detergent. The proportion of radioactivity remaining in the liver 5 days after the administration of radioactive α-tocopherol was increased when PSM or PPP was present, perhaps indicating increased absorption via the portal vein. The results suggest that PPP may be of therapeutic value in aiding fat absorption where bile salts are deficient.

6934 EVIDENCE FOR THE SECRETORY TRANSPORT MECHANISM OF INTESTINAL IMMUNOGLOBULIN. THE ULTRASTRUCTURAL DISTRIBUTION OF IgM.

(Eng.) Allen, W. D.; Smith, C. G.; Porter, P. (Unilever Research Lab., Colworth House, Sharnbrook, Bedford, England). *Immunology* 30(3):449-457; 1976.

The intracellular localization of immunoglobulin M (IgM) in porcine intestinal tissue was studied by immunoelectron microscopy and immunofluorescence. Tissues from the proximal duodenum, mid-jejunum, and terminal ileum were stained with fluorescein isothiocyanate (FITC)-labeled antisera. There were three distinct zones of staining. Numerous lymphoid cells with bright cytoplasmic staining were seen in the intercryptal lamina propria. Intense staining was also seen in the apical cytoplasm of crypt epithelial cells, mainly the supranuclear region. The third zone was in the lumen of blood vessels, particularly the subepithelial capillary loops. Although there were fewer IgM-containing vesicles in the crypt epithelium than those containing IgA (seen previously), their location within the cytoplasm was similar. These observations indicate a degree of selective transport. Although crypt epithelial cells can transport both Ig simultaneously, factors other than competition by secretory Ig for common receptor sites may be involved.

6935 EFFECTS OF ALCOHOL ON ION TRANSPORT BY ISOLATED GASTRIC AND ESOPHAGEAL MUCOSA.

(Eng.) Fromm, D.; Robertson, R. (Beth Israel Hosp., 330 Brookline Ave., Boston, MA 02215). *Gastroenterology* 70(2):220-225; 1976.

The effects of 20% ethyl alcohol on steady state rates of ion transport were studied in isolated rabbit gastric and esophageal mucosa. The initial mean rate of acid secretion in the fundic mucosa was 2.6 μEq/hr/cm^2. The luminal, but not serosal, addition of alcohol decreased this rate by 1.8 μEq/hr/cm^2 (p<0.001). This change was associated with a decrease in the mean potential difference (PD), from 3.3 mV to 0.4 mV (p<0.01) and mean electrical resistance, from 109 ohms/cm^2 to 54.5 ohms/cm^2 (p<0.001). The rate of alcohol secretion in the presence of alcohol in the lumen was resistant to stimulation by serosal addition of 0.09 mM histamine, 10 mM theophylline, 2 mM dibutyryl cyclic AMP, and porcine gastrin (0.5 μg/ml). In antral mucosa, the mean rate of luminal acid loss (0.7 μEq/hr/cm^2) was increased by 0.7 μEq/hr/cm^2 (p<0.001) after the addition of alcohol. In the absence of alcohol, there was a net secretion of Na and Cl across the antral mucosa. When alcohol was added, the net Na flux was not significantly different from zero (p>0.5), and a 63% reduction (p<0.001) in net Cl secretion occurred. These changes were associated with significant increases in the unidirectional luminal to serosal and serosal to luminal fluxes of Na and Cl and with a significant decrease in electrical resistance. The mean rate of luminal acid loss in the presence of 0.001 mM ouabain (0.8 μEq/hr/cm^2) increased by 1.0 μEq/hr/cm^2 (p<0.001) following the addition of alcohol, and the electrical resistance decreased significantly by 89.7 ohms/cm^2. Alcohol had no effect on the rate of luminal acid loss or electrical resistance of esophageal mucosa. The luminal application of alcohol inhibits active ion transport, in addition to increasing cation and anion permeability. Inhibition of active transport *per se* is not necessarily associated with an increase in mucosal permeability.

6936 INFLUENCE OF REPRODUCTIVE STATE ON INTESTINAL FLUID AND ION TRANSPORT BY THE RAT JEJUNUM, IN RELATION TO THE POSSIBLE CONTRIBUTION OF PROLACTIN.

(Eng.) Mainoya, J. R. (Dept. Zoology, Univ. Dar-es-Salaam, Dar-es-Salaam, Tanzania). *J. Endocrinol.* 67(3):351-358; 1975.

The ability of everted jejunal sacs (segments III and IV) to transport fluid and electrolytes was determined in Sprague-Dawley rats at various stages of the estrus cycle and of pregnancy. The mean levels of fluid and NaCl absorption in both jejunal segments were significantly higher during pro-estrus (1.48 ml/g/hr, 223.8 μEq/g/hr, and 35.4 μEq/g/hr for mucosal fluid, Na$^+$, and Cl$^-$ transport, resp., in jejunal segment III; 1.59 ml/g/hr, 224.9 μEq/g/hr, and 26.7 μEq/g/hr, resp., in segment IV) and in estrus (1.57 ml/g/hr, 200.2 μEq/g/hr, and 30.1 μEq/g/hr, resp., in segment III; 1.85 ml/g/hr, 240.9 μEq/g/hr, and 29.2 μEq/g/hr, resp. in segment IV) than in diestrus (0.96 ml/g/hr, 122.1 μEq/g/hr, and 10.3 μEq/g/hr, resp., in segment III; 1.12 ml/g/hr, 143.7 μEq/g/hr, and 6.6 μEq/g/hr, resp., in segment IV). The s.c. administration of prolactin (1.0 mg, 48 and 24 hr before sacrifice) significantly increased mucosal fluid and ion transfer in diestrus rats (1.57 ml/g/hr, 227.3 μEq/g/hr, and 63.3 μEq/g/hr, resp., in segment III; 1.79 ml/g/hr, 245.5 μEq/g/hr, and 61.4 μEq/g/hr, resp., in segment IV) in comparison with untreated diestrus rats (0.73 ml/g/hr, 105.3 μEq/g/hr, and 8.6 μEq/g/hr, resp., in segment III; 0.97 ml/g/hr, 124.6 μEq/g/hr, and 11.5 μEq/g/hr, resp., in segment IV), but not in estrus rats. Ovariectomy in diestrus rats had no significant effect on fluid and sodium absorption, but resulted in increased chloride absorption in segment III. Treatment with s.c. estradiol benzoate (5 μg/day, 4 days) caused increases in mucosal fluid and sodium, but not chloride transport in ovariectomized diestrus rats (1.36 ml/g/hr and 170 μEq/g/hr, resp., in segment III; 1.65 ml/g/hr and 188.4 μEq/g/hr, resp., in segment IV) in comparison with untreated ovariectomized animals (1.04 ml/g/hr and 129.1 μEq/g/hr, resp., in segment III; 1.18 ml/g/hr and 136.4 μEq/g/hr, resp., in segment IV). Progesterone treatment (1.0 mg/day, 4 days, s.c.) had no influence on fluid and sodium transport, but inhibited chloride absorption. The intestinal absorption of fluid, sodium, chloride, potassium, calcium, and magnesium was significantly increased in midpregnant and lactating rats. When these animals were treated with 2-Br-α-ergocryptine (60 μg/day, 5 days, s.c.), the absorption rates were depressed, although they were still higher than those in diestrus rats. Lactating rats suckling up to the time of the experiment had significantly increased mucosal fluid and NaCl transfer. Lactating rats, not suckled for 24 hr or subjected to a reduction in the number of pups from eight to three, did not show major changes in intestinal fluid or NaCl absorption. The data suggest that increases in intestinal transport during estrus, pregnancy, and lactation are attributable to hormonal changes to which prolactin may make an important contribution.

6937 A MODEL SYSTEM FOR INVESTIGATING THE BILIARY EXCRETION OF AN ANION IN THE RAT.

(Eng.) Powell, G. M.; Jones, J. G.; Olavessen, H. A.; Curtin, C. G. (Dept. Biochemistry, Univ. Coll., P.O. Box 78, Cardiff CF1 1XL, U.K.). *Biochem. J.* 148(2):303-307; 1975.

The validity of a model system for investigating the biliary excretion of phenolphthalein di[^{35}S]sulfate, specifically, the mechanisms by which this conjugate is transferred into bile, was studied. The conjugate was administered to male MRC hooded rats with bile duct fistulas by continuous i.v. infusion at 3, 4.5, 6, 9, and 12 μg/min or in single doses of 1.4-16 mg. The excretion rate of the ester into bile increased with time, eventually reaching steady state. Each steady-state value was considerably less than its corresponding infusion rate (five dose mean 68% ± 16%). The lag period before the steady-state showed no correlation with infusion rate (mean lag 22.2 ± 5.9 min). There was no positive correlation between bile production and infusion rate, but there was a correlation between bile production and the proportion of conjugate excreted in the bile. The results of the single-dose experiments were similar, illustrating that the model may also be applied to single-dose studies. An essential feature of this model is the presence of a compartment into which the ester may pass as an alternative to direct excretion via the bile. Whole-body radioautography experiments, in which each animal received 1 mg conjugate/0.2 ml water i.v., were performed to locate this compartment. Since there was a significant accumulation of radioactivity in the liver only, this compartment may be located in the liver.

6938 EFFECTS OF CALCIUM SOLUBILITY ON ABSORPTION BY RATS WITH INDUCED ACHLORHYDRIA.

(Eng.) Mahoney, A. W.; Holbrook, R. S.; Hendricks, D. G. (UMC 87, Utah State Univ., Logan, UT 84322). *Nutr. Metab.* 18(5/6):310-317; 1975.

Calcium absorption was studied in achlorhydric male Sprague-Dawley rats. The rats were made achlorhydric by x-irradiating the stomach, and sham-operated animals served as controls. The rats were fed diets containing very soluble calcium chloride or calcium gluconate, or slightly soluble calcium carbonate or tricalcium phosphate for 3 weeks. X-irradiated rats fed the diet containing calcium chloride had greater bone strength (5.00 kg) than the x-irradiated rats fed calcium carbonate (3.97 kg). However, the x-irradiated achlorhydric rats were unable to deposit as much calcium in their femurs as sham-operated controls fed the same diet (186 g/kg intake versus 264 g/kg, $p<0.05$). The x-irradiated rats fed diets containing tricalcium phosphate or calcium gluconate had consistently higher mean gastric pH values (6.8 and 7.0, resp.) and absorbed less calcium (-70 and 254 g/kg intake, resp.) than did the sham-operated controls [gastric pH 3.7 and 1.8 on $Ca_3(PO_1)_2$ or Ca gluconate diets, resp.; absorption 404 and 345 g/kg, resp.]. The x-irradiated rats fed slightly soluble tricalcium phosphate had much smaller (1.63 g/kg) and weaker (3.64 kg) femurs that contained less calcium and phosphorus (134 and 79 g/kg air-dry bone) than did controls fed the same diet (1.85 g/kg, 8.32 kg, 209 g/kg, and 85 g/kg, resp.) or x-irradiated animals fed Ca gluconate (2.24 g/kg, 6.69 kg, 213 g/kg, and 90 g/kg, resp.). Apparently, the very soluble dietary calcium offset the impaired calcium absorption of achlorhydric rats.

6939 MECHANISMS OF THE ABSORPTION OF WATER-SOLUBLE DYES FROM THE RAT SMALL INTESTINE.

(Eng.) Nakamura, J.; Yoshizaki, Y.; Yasuhara, M.; Kimura, T.; Muranishi, S.; Sezaki, H. (Faculty Pharmaceutical Sciences, Kyoto Univ., Yoshida Shimoadachi-cho, Sakyo-ku, Kyoto, Japan). *Chem. Pharm. Bull. (Tokyo)* 24(4):683-690; 1976.

The absorption of four water-soluble dyes, methylene blue (MB), bromthymol blue (BTB), bromphenol blue (BPB), and phenol red (PR), from the small intestine of male Wistar albino rats was investigated. An *in situ* perfusion technique was used in which 40 ml of dye solution were recirculated through the intestine at a rate of 5 ml/min. Homogenates were prepared from the isolated small intestine, and the amount of dye was determined spectrophotometrically. The net absorption of MB, BTB, BPB, and PR was 46.0%, 14.7%, 2.4%, and 1.2%, resp. The degree of binding to mucosal homogenates, determined *in vitro*, was correlated to the percentage disappearance from the lumen and tissue accumulation rather than net absorption. Binding to brush borders was related to the degree of uptake by the isolated epithelial cells. These results suggest that binding to the mucosa, especially to the brush borders (microvilli) as the first step, is important in the absorption of these water-soluble dyes from the rat small intestine. The poor absorbability of PR is due to its low affinity to the intestinal mucosa and its poor lipoid solubility.

6940 INHIBITION OF WATER ABSORPTION IN THE INTESTINE BY Staphylococcus aureus DELTA-TOXIN.

(Eng.) Kapral, F. A.; O'Brien, A. D.; Ruff, P. D.; Drugan, W. J., Jr. (Dept. Medical Microbiology, Ohio State Univ., Columbus, OH 43210). *Infect. Immun.* 13(1):140-145; 1976.

To determine whether *Staphylococcus aureus* delta toxin affects water absorption in the intestine, water absorption was monitored by measuring the concentration of polyethylene glycol in a solution continuously perfused through the lumen of jejunal and ileal segments of the rabbit *in vivo* and of ileal segments of the guinea pig *in vitro*. In the proximal rabbit jejunum, water absorption was reduced by 1 mg/ml of delta toxin and completely inhibited by 2 mg/ml of toxin. With the larger dose, movement of fluid into the lumen occurred after 3 hr. In the distal jejunum, the lower dose increased water absorption, but the higher dose reduced absorption for 4 hr. Both doses produced a consistent response in the ileum. At 2 mg/ml, there was an immediate cessation of water absorption, which persisted throughout the 6-hr experimental period. Guinea pig ileal segments *in vitro* demonstrated a net transfer of water from mucosa to serosa that was inhibited by both doses of toxin. The dose required to cause inhibition of water absorption in 50% of the guinea pig ileal segments was calculated to be 300 μg/ml. Cholera toxin (0.5 μg/cm^2 of mucosa) inhibited water absorption *in vitro*, but *S. aureus* enterotoxin B (5 μg/cm^2) had no effect. The results show that delta toxin interferes with intestinal water absorption *in vivo* and *in vitro*.

Since water movement across the mucosa is secondary to ion transport, these findings suggest that the primary action of delta toxin is alteration of normal ion transport.

6941 POLYCHLORINATED BIPHENYLS AND INTESTINAL ABSORPTION OF D-GLUCOSE IN MICE. (Eng.)

Madge, D. S. (Dept. Biological Sciences, Wye Coll. [Univ. London], Ashford, Kent TN25 5AH, England). *Gen. Pharmacol.* 7(1):45-48; 1976.

6942 GASTRIC MUCOSAL PERMEABILITY--A RELATIONSHIP BETWEEN ISCHEMIA AND CELLULAR DAMAGE [Abstract]. (Eng.)

Newman, B. M.; Knowlson, T.; Elder, J. B. (Royal Infirmary, Manchester, England). *Gut* 17(5):401; 1976.

See also, 7066, 7068, 7087, 7201, 7268, 7295.

MOTILITY

6943 EFFECTS OF PGA AND PGB COMPOUNDS ON GASTROINTESTINAL TRACT SMOOTH MUSCLE FROM MAN AND LABORATORY ANIMALS. (Eng.)

Adaikan, P. G.; Karim, S. M. M. (Kandang Kerbau Hosp., Univ. Singapore, Singapore 8). *Prostaglandins* 11(1):15-22; 1976.

The effects of prostaglandin E_2 (PGE_2), $PGF_{2}\alpha$, PGA_1, PGA_2, PGB_1, and PGB_2 on the longitudinal and circular muscle from the body of human stomach were studied, and their relative potencies on the longitudinal muscles of the gastrointestinal tract from rat, hamster, guinea pig, and chicken were investigated. The prostaglandins contracted longitudinal muscle of the human stomach. The potencies in decreasing order, together with the threshold dose range, were: PGE_2 (4-80 ng/ml), PGB_2 (10-400 ng/ml), $PGF_{2}\alpha$ (25-800 ng/ml), PGA_2 (160-400 ng/ml), PGB_1 (16-800 ng/ml), and PGA_1 (200-400 ng/ml). In the circular muscle of the human stomach, the most potent stimulant was PGB_2 (40-400 ng/ml), followed by $PGF_{2}\alpha$ (40-800 mg/ml), PGA_2 (100-1,600 ng/ml), PGB_1 (200-800 ng/ml), and PGA_1 (800-4,000 ng/ml). PGE_2 had a relaxant effect on all circular muscle strips, the threshold dose being within the range 0.1 and 0.4 μg/ml. In four circular muscle strips, the tone of the muscle did not return to the basal level after contractions were induced with either PGA_2 or PGB_2. In these strips, small doses of $PGF_{2}\alpha$ (100-200 ng/ml) produced contraction, followed by marked relaxation of the muscle. In circular strips not previously exposed to PGA_2 or PGB_2, increasing the applied load of PGF_{2_α} from the usual 1.5 g (which produced contraction) to 3.5 g also resulted in relaxation. This effect was not seen with longitudinal muscle strips. PGA_1, PGA_2, PGB_1, and PGB_2 showed weak smooth muscle-stimulating activities compared to PGE_2 and $PGF_{2}\alpha$. The results show that PGA and PGB compounds are not inactive derivatives of E prostaglandins, but have potent smooth muscle-stimulating activities.

6944 EFFECT OF SECRETIN, GLUCAGON AND VIP ON GALLBLADDER CONTRACTION. (Eng.)

Vagne, M.; Troitskaja, V. (Unite de Recherches de Physiopathologie digestive, Inserm U-45, Hopital Edouard-Herriot, Pavillon Hbis, F-69374 Lyon Cedex 2, France). *Digestion* 14(1):62-67; 1976.

Because of the structural similarities of the peptides, secretin, glucagon, and vasoactive intestinal peptide (VIP), their effects on cholecystokinin (CCK, 0.05, 0.1, 0.2, and 0.4 U, i.v.)-induced gallbladder contraction were studied *in vivo* in the guinea pig. The gastric secretions in each animal were diverted, and gallbladder contraction was measured using a length transducer and recorder. Secretin (1, 4, and 16 U), glucagon (1, 4, and 16 μg), and VIP (0.05, 1, and 2 μg) were administered i.v. 1 min before the CCK injection. Secretin caused a significant increase in the amplitude and duration of CCK responses. Given with each of the three doses of CCK, 16 U of secretin produced the same response as doubling the CCK dose. Glucagon increased the responses slightly. VIP decreased the responses to all doses of CCK. The calculated mean showed a decrease to about half of CCK response alone. The results show that three structurally related peptides of the gastrointestinal tract have different effects on gallbladder contraction.

6945 EFFECT OF AN ELEMENTAL DIET ON THE ELECTRICAL ACTIVITY OF THE SMALL INTESTINE IN DOGS. (Eng.)

Moore, E. P.; Copeland, E. M.; Dudrick, S. J.; Weisbrodt, N. W. (John Peter Smith Hosp., Ft. Worth, TX). *J. Surg. Res.* 20(6):533-537; 1976.

Because it has been postulated that elemental diets rest the small bowel by decreasing motility and secretions, the effects of an elemental diet on the patterns of motility of the small intestine were investigated in three dogs. Fourteen silver electrodes were fixed equidistant along the serosal surface of the entire small intestine. Recordings (1-4 hr) were made in conscious animals that were fed for several weeks on a normal dog food diet, both after an 18-hr fast and immediately following the ingestion of 1 lb of dog food. Similarly, records were obtained after fasting and after feeding the elemental diet. In all recordings obtained during fasting, cyclically recurring myoelectric complexes were evident; the overall average number of slow waves with spike potentials at one electrode during 1 hr of recording was 196. Feeding dog food elicited a pattern characterized by a more continuous level of spike potentials at all electrode sites; at no time did the level of activity approach 100%, and seldom did it fall to zero. The average number of slow waves with spike potentials at one electrode in the three dogs was 499. The ingestion of an elemental diet elicited a pattern that was more uniform than that seen during fasting, and the number of slow waves with spike potentials was significantly less than that measured following a meal of canned dog food. Fewer spike potentials occurred in the distal small intestine; consequently, the average number of slow waves with spike potentials at one electrode in the proximal bowel was 304. The results suggest that although i.v. hyperalimentation is the best way of obtaining optimal bowel rest, the ingestion of a chemically defined diet is significantly better than ingestion of a regular diet.

6946 THE DEPRESSOR EFFECT OF DOPAMINE ON THE ELECTRICAL AND MECHANICAL ACTIVITIES OF CAT SMALL INTESTINE. (Eng.) Ohkawa, H.; Watanabe, M. (Dept. Physiology, Yamaguchi Univ. Sch. Medicine, Ube, Japan). *Tohoku J. Exp. Med.* (1):69-77; 1975.

The inhibitory actions of externally applied dopamine and other adrenergic stimulants on the electrical and mechanical activities of the adult cat small intestine were observed using pressure electrodes. D,L-(3,4-dihydroxyphenyl)analine (DOPA, 10^{-7}-10^{-5} g/ml) and dopamine (10^{-6}-10^{-5} g/ml) reduced the spike and mechanical activities. The effects of dopamine were suppressed by treatment with phentolamine (10^{-5} g/ml), phenoxybenzamine (10^{-6} g/ml), or propranolol (10^{-5} g/ml). This showed that the β-response was predominant in the intestine. Noradrenalin (10^{-6} -10^{-5} g/ml) and adrenalin (10^{-6} g/ml) also blocked spike generation and depressed mechanical activity; however, these actions in turn were abolished by adrenergic blockers (dibenamine, 10^{-5} g/ml, and propranolol, 10^{-5} g/ml). No significant effects of normetanephrine and metanephrine were detected. Dose-response curves for acetylcholine with and without dopamine, isoproterenol, phenylephrine, and noradrenalin were obtained. Those with the adrenergic stimulants were shifted to higher concentrations of acetylcholine. It is concluded that dopamine acts on α- and β-receptors, and there is no direct evidence for the presence of separate dopamine receptors.

6947 EFFECT OF PROSTAGLANDIN $F_{2}\alpha$ ON PROPULSIVE ACTIVITY OF THE ISOLATED SEGMENTAL COLON OF THE GUINEA-PIG. (Eng.) Ishizawa, M.; Miyazaki, E. (Sapporo Medical Coll., W. 17, S.1, Sapporo, Japan). *Prostaglandins* 10(5):759-768; 1975.

The effects of prostaglandin $F_{2}\alpha$ ($PGF_{2}\alpha$) on propulsive activity were investigated *in vitro* in 3-cm distal colon segments and colonic longitudinal and circular muscle strips from guinea pigs. $PGF_{2}\alpha$ (5×10^{-8}-1×10^{-6} M), added to the bathing medium, increased propulsive activity in a concentration-dependent manner. This increase was abolished in the presence of atropine or tetrodotoxin (1×10^{-7} g/ml). The contractions produced by $PGE_{2}\alpha$ (5×10^{-7}-1×10^{-5}M) in isolated longitudinal and circular smooth muscle strips were unaffected by atropine or tetrodotoxin (1×10^{-7}g/ml). It is concluded that propulsive activity stimulated by $PGF_{2}\alpha$ may depend on the contractions of both muscle layers and stimulation of the peristaltic reflex.

6948 MOTILITY OF THE LARGE INTESTINE OF PIEBALD-LETHAL MICE. (Eng.) Brann, L.; Wood, J. D. (Univ. Kansas Medical Center, Kansas City, KS 66103). *Am. J. Dig. Dis.* 21(8):633-640; 1976.

To determine whether the contractile activity of the musculature of the large intestine of piebald-lethal mice is abnormal only in the terminal segment, which is hypoganglionic, the *in vitro* propulsion of artificial fecal pellets was observed in the colons of these animals and in the colons of normal siblings. Peristaltic activity in the isolated large intestines of normal mice propelled the artificial fecal pellets from the proximal colon to the anal end of the intestine. Peristalsis was blocked by the administration of lidocaine HCl (1×10^{-5} g/ml), which resulted in a 10-15% increase in bowel length. These observations indicate that contractile activity of the external muscularis during peristalsis is coordinated by intrinsic neuronal mechanisms and that coordinated propulsion of a solid bolus can occur in the absence of extrinsic autonomic innervation. In most of the preparations from the piebald mice, the colon was distended by impacted fecal matter. The rectal region was constricted and contained no fecal matter. When the lumen was cleared of fecal content, artificial fecal pellets were actively propelled throughout the previously distended region of the colon, but propulsion did not continue beyond the proximal margin of the terminal aganglionic segment. This indicates that the peristaltic mechanisms for propulsion of an intraluminal bolus are functional in the dilated portion of the colon and nonfunctional in the terminal segment. In 19 of 22 preparations, the pellet stopped at the terminal segment and was then actively propelled in the reverse direction back through the dilated portion of the colon. Reverse peristalsis was also seen in colon preparations of rats with imperforate anus and in preparations of normal intestine obstructed with a ligature, suggesting that reverse peristalsis may be a general response to distal obstruction, and implying that the distended portion of the colon of piebald mice is capable of coordinated peristalsis.

6949 GASTRIC PACEMAKERS. (Eng.) Sarna, S. K.; Bowes, K. L.; Daniel, E. E. (McMaster Univ. Medical Center, 1200 Main St. West, Hamilton, Ontario, Canada L8S 4J9). *Gastroenterology* 70(2): 226-231; 1976.

Experiments were carried out to determine if a reversal in the direction of phase lag among control waves by an electronic pacemaker surgically implanted near the pylorus in dogs would reverse the sequence of normal aborad contractions and delay gastric emptying. Electrical stimulation was applied to 5.8-6.0 pulses/min, 50-80 msec pulse width, and 10-14-volt pulse amplitude. When liquid gastric emptying was measured by introducing 400-600 ml of phenol red by a nasogastric tube through an esophagostomy into the stomach and by withdrawing the remainder after 5- and 15-min periods, the mean percentage of phenol red remaining in the stomach with the pacemaker on was 51.2% and with the pacemaker off, 24.2%. The sequence of the occurrence of electrical response activity was reversed, indicating that the contractions originated near the pylorus and moved orally. When liquid gastric emptying was measured by the above method, but with barium sulfate mixed with phenol red (10 g/100 ml phenol red), the mean percentage volume of meal remaining in the stomach after 15 min with the pacemaker was 49.1%, and without the pacemaker, 25.2%. With this meal, the sequence of contractions observed on an image intensifier was orad with the pacemaker and aborad without the pacemaker. Solid meal emptying was measured using radiological image intensifier observation of the gastric emptying of small barium-filled balls. When the pacemaker was turned off, the emptying patterns of the spheres was unpredictable, the emptying time varying from 15 to 150 min. With the pacemaker on, the spheres were pushed back into the proximal stomach, due to orad sequential contractions. In one experiment, all 15 spheres normally emptied in 135 min; with the pacemaker on, none of the spheres emptied at the end of 300 min. These studies show that sequential aborad contractions in the stomach play an important role in the emptying of liquid and solid meals.

6950 THE ROLE OF ADRENERGIC RECEPTORS IN THE REGULATION OF GASTRIC MOTILITY IN THE RAT. (Eng.) Gati, T.; Gelencser, F.; Hideg, J. (Semmelweis Medical Univ., Budapest 9, Hungary). *Z. Exp. Chir.* 8(3):179-184; 1975.

Experiments were carried out in rats to determine whether the inhibitory effect of epinephrine and norepinephrine on gastrointestinal motility is mediated through alpha or beta adrenergic receptors. When the animals received 2.5 μg/100 g of epinephrine or norepinephrine 30 min before and seven times every 30 min after the intragastric administration of radiopaque material, most of the opaque material remained in the stomach after 3 hr; in controls, the radiopaque material had fully evacuated by this time. Pylorotomy did not affect epinephrine-induced inhibition of gastric motility. Gastric evacuation was unaffected 3 hr after the i.p. administration of phenylephrine (0.5 mg/100 g), the mean evacuation after 3 hr being 89%. When the same amounts of phenoxybenzamine, isoproterenol, and propranolol were administered i.p., the mean evacuation was 63%, 25%, and 95%, resp. Pretreatment with phenoxybenzamine (an alpha receptor blocking agent) had no effect on epinephrine-induced inhibition of gastric motility; the mean evacuation 3 hr after the administration of both drugs was 30%. Pretreatment with propranolol (a beta receptor blocking agent) completely blocked the effect of epinephrine, a mean evacuation of 88%. The results suggest that epinephrine exerts its inhibitory effect on gastric motility via adrenergic beta receptors.

6951 INFLUENCE OF THE REMOVAL OF EXTERNAL Na ON THE TONUS AND DRUG-INDUCED CONTRACTION OF THE ISOLATED RAT RECTUM, PARTICULARLY IN RELATION TO Ca. (Eng.) Taniyama, K.; Araki, H.; Cheng, J. T.; Maeda, M.; Matsumoto, H. (Kobe Univ. Sch. Medicine, Kobe, Japan). *Kobe J. Med. Sci.* 21(4):97-108; 1975.

6952 EFFECTS OF AMINOPHYLLINE AND THE REMOVAL OF EXTERNAL Na ON THE ANTISPASMODIC ACTION OF ISOPROTERENOL IN ISOLATED RAT RECTUM, PARTICULARLY IN RELATION TO Ca. (Eng.) Taniyama, K.; Takahashi, N.; Cheng, J. T.; Kosuda, T.; Matsumoto, H. (Kobe Univ. Sch. Medicine, Kobe, Japan). *Kobe J. Med. Sci.* 21(4):109-115; 1975.

6953 ON THE MECHANISM OF THE RELAXING ADRENALINE EFFECT ON CAT JEJUNUM. (Eng.) Petkov, V.; Radomirov, R. (Inst. Physiology, Bulgarian Acad. Sciences, Bulgaria). *Acta Physiol. Pharmacol. Bulg.* 3/4:41-50; 1976.

See also, 6961, 7102.

SECRETION AND METABOLISM

6954 SUPPRESSION OF GASTRIN RELEASE AND GASTRIC SECRETION BY GASTRIC INHIBITORY POLYPEPTIDE (GIP) AND VASOACTIVE INTESTINAL POLYPEPTIDE (VIP). (Eng.) Villar, H. V.; Fender, H. R.; Rayford, P. L.; Bloom, S. R.; Ramus, N. I.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *Ann. Surg.* 184(1):97-102; 1976.

The effects of gastric inhibitory polypeptide (GIP) and vasoactive intestinal peptide (VIP) on basal and food-stimulated serum gastrin and gastric acid secretion levels were studied in five Heidenhain pouch dogs. On random days during a 7-day test period, either normal saline or GIP (2 μg/kg/hr) or VIP (1 μg/kg/hr) was infused for 1 hr, after which each dog was given a high protein meal. Neither GIP nor VIP infusions had an effect on basal gastrin levels. When the dogs were fed and the infusions continued, the mean serum gastrin levels in the controls, GIP-infused, and VIP-infused dogs increased from baseline levels of 46-59 pg/ml to peak levels of 517, 409, and 298 pg/ml, resp.; these levels were achieved at 15, 15, and 90 min, resp. In controls, the gastrin level remained at a plateau above 450 pg/ml throughout the study, while it progressively declined in the sera of dogs infused with GIP and VIP. The serum gastrin concentrations in the dogs receiving GIP were significantly lower than those in controls at 120 and 180 min, and the values in dogs receiving VIP were significantly lower at 65, 120, 150, and 180 min. At 90 min, the control gastrin concentration of 494 pg/ml was diminished by approximately 30% by GIP and by 40% by VIP. The relative molar concentration of GIP to VIP was 19:1. These results suggest that VIP is a much more potent inhibitor of gastrin release than is GIP. The gastric acid output in the controls was approximately 50% more than in dogs that received GIP or VIP, but this suppression was not statistically different. The mean basal insulin levels were 13.9, 15.5, and 16.7 μU/ml in the control, GIP, and VIP groups, resp. GIP caused a significant insulin elevation at 30 min (19.1 μU/ml), and food plus GIP caused significant insulin elevations at 90 min (22.1 μU/ml) and 120 min (24.8 μU/ml). The insulin levels were significantly increased above basal levels at 90 min (37.5 μU/ml), 150 min (21.4 μU/ml), and 180 min (21.4 μU/ml) after VIP infusion. Since there was no associated release of glucose with the increase in insulin levels with GIP, it may be assumed that GIP is insulinotropic. Measurements of GIP and VIP by specific radioimmunoassays showed that VIP infusion had no effect on GIP plasma levels and *vice versa*. GIP plasma levels increased during GIP infusion, and VIP plasma levels increased during VIP infusion, indicating that these polypeptides are immunologically recognizable in circulation.

6955 BASIC AND CLINICAL RESEARCH ON SECRETIN. (Eng.) Omata, S. (Yokohama City Hosp., Yokohama, Japan). *Jpn. J. Med.* 14(1):16-17; 1975.

See also, 6961, 7044.

SECRETION AND METABOLISM

Stomach

6956 THE EFFECTS OF ATROPINE ON THE RESPONSE TO PENTAGASTRIN OF ANAESTHETISED AND CONSCIOUS DOG PREPARATIONS. (Eng.) Schofield, B.; Tepperman, B. L.; Davison, J. S. (Div. Medical Physiology, Univ. Calgary, 2920 24 Ave. N.W., Calgary, Alberta, Canada T2N IN4). *Rend. Gastroenterol.* 7 (3):147-152; 1975.

The effect of the i.v. administration of atropine on gastrin-stimulated acid secretion was studied in anesthetized and conscious dogs with intact stomachs or Heidenhain pouches, some of which had gastric fistulae. Atropine (100 μg/kg) produced no significant change in pentagastrin (0.05 μg/kg/min, i.v.)-stimulated acid secretion in whole stomachs of dogs anesthetized with 2% α-chloralose (80 mg/kg, i.v.). When atropine (25 μg/kg) was administered 45 min prior to the administration of anesthesia in Heidenhain pouch dogs, the pentagastrin-stimulated acid secretion was inhibited to 51% of the initial level. In dogs with a gastric fistula, atropine also produced a significant reduction (-59%) of pentagastrin-stimulated secretion. In further experiments, atropine (25 μg/kg) was administered to conscious animals during peak Heidenhain pouch secretion induced with pentagastrin (0.16 μg/kg/min). There was an inhibition (-48%) of the same order as that seen in the anesthetized animals. It appears that pentagastrin-stimulated acid secretion is not affected by the administration of anesthesia.

6957 THE DEVELOPMENT OF A RELIABLE AND SENSITIVE BIOASSAY FOR GASTRIN IN BODY FLUIDS. (Eng.) Halter, F.; Kohler, B.; Leuenberger, J.; Smith, G. M.; Varga, L. (University Hosp., Inselspital, Berne, Switzerland). *Eur. J. Pharmacol.* 35 (2):369-378; 1976.

The sensitivity and reliability of the Ghosh and Schild rat stomach preparation to gastrin were improved to facilitate the preoperative diagnosis of the Zollinger-Ellison syndrome and to correlate the gastrin bio- and immunoassays on a large scale. A bulky intragastric cannula was implanted in male Wistar rats; the perfusate was recirculated, and conductivity was measured instead of pH. With these procedures, the threshold values for synthetic human gastrin I (HG I) were in the range of 1-2 ng. Neither vagotomy nor antrectomy influenced the sensitivity of the method. The threshold values were not lowered by attempts to reduce gastrin metabolism through nephroligature or small bowel resection. Although portacaval shunts did raise the threshold, the limited increase in sensitivity was also achieved by selecting rats that gave an initially high response to a test dose of gastrin, avoiding the complicated shunt operation. The assay procedure enabled statistically valid measurements of gastrin in plasma and in tumor extracts from patients suffering from the Zollinger-Ellison syndrome to be assayed using a 2 + 2 block design. In comparison to earlier re-perfusion systems, this method is not only simpler and more precise, but considerably more sensitive.

6958 IMMUNOREACTIVE GASTRIN IN DIFFERENTIAL AND DENSITY GRADIENT FRACTIONS OF RAT GASTRIC MUCOSA. (Eng.) Trotman, C. N. A.; Fiddes, I. J. S.; Grund, E. R.; McHanwell, S.; Sanders, D. J.; Sanderson, C.; Shaw, B. (Dept. Physiology, Medical Sch., Univ. Newcastle upon Tyne, Newcastle upon Tyne, NE1 7RU, England). *J. Endocrinol.* 68(1):5-12; 1976.

Gastrin storage granules or vesicles were separated from the nuclei and mitochondria of Wistar rats to facilitate studies of the functional properties of the vesicle membrane and the molecular composition of the vesicle contents. The distribution of immunoreactive gastrin and the subcellular markers between four particulate fractions and the supernatant from rat gastric mucosal homogenates were determined, and the gastrin storage vesicles were further characterized by isopycnic equilibration in continuous sucrose density gradients. The distribution of marker enzymes confirmed that a 10% (weight/volume) homogenate of rat gastric mucosa could be fractionated without very serious interference from mucus. The mucosa was homogenized and centrifuged before and after its direct application to the gradient. The sedimentational properties of subcellular gastrin-containing structures were distinct from those of the mitochondria. After centrifugation, the peak of immunoreactive gastrin was found in sucrose with a density of 1.17 to 1.18 g cm^{-3} (1.35 M, 39.5%, weight/weight), and the individual peaks were consistently close to this value. This finding was independent of the magnitude of the peak, which varied widely between 3.4 and 125 ng of immunoreactive gastrin, except that smaller peaks were sharper. A thermolabile component with ^{125}I-labeled gastrin-binding activity present in gastric mucosal homogenates and fractions was not associated with the gastrin storage vesicles sedimenting in density gradients. The possibilities that the binding activity is intravesicular and that it may be concerned with gastrin storage are unlikely.

6959 RESPONSE OF SECRETING AND NONSECRETING GASTRIC MUCOSA TO H^+ BACK-DIFFUSION. (Eng.) O'Brien, P.; Fromm, D.; Silen, W. (Harvard Medical Sch., Boston, MA). *Surg. Forum* 26:378-380; 1975.

The influence of the secretory state of the bullfrog gastric mucosa on the ability of this tissue to withstand back-diffusion of H^+ was studied by passing an electric current through the tissue; the consequences of the current in spontaneously secreting and inhibited mucosae were also studied. Thirty minutes after the induction of H^+ back-diffusion in nonsecreting mucosa by the passage of current (510 μa/cm^2), an 87% reduction in the potential difference and decreases in the mean resistance and short-circuit current were noted. In spontaneously secreting mucosae and in histamine-stimulated mucosae after inhibition by 4 mM burimamide, there was a significant decrease in potential difference, but resistance was not significantly changed. The data indicate that the secretory state of the mucosa plays an important role in the ability of the mucosa to withstand H^+ back-diffusion. The absolute quantity of H^+ that leaves the luminal solution may be less important than the quantity of H^+ that can be handled by the tissue at any one time.

6960 ACTIVATION OF PROTEIN KINASE IN THE GUINEA PIG FUNDIC GASTRIC MUCOSA BY HISTAMINE. (Eng.) Wollin, A.; Barnes, L. D.; Hui, Y. S.; Dousa, T. P. (Mayo Clinic Foundation, Rochester, MN). *Life Sci.* 17(8):1303-1306; 1975.

Studies were carried out to determine whether histamine, through mediation by cyclic AMP (cAMP), can activate protein kinase in the intact cells of the gastric mucosa from the guinea pig fundus. Incubation with 10^{-4} M histamine significantly increased the tissue level of cAMP from a mean control level of 14.71 pmol/mg protein to 64.64 pmol/mg protein ($p<0.005$). The (-cAMP/+cAMP) protein kinase activity ratio was increased from a mean control level of 0.739 to 0.897 ($p<0.05$). Protein kinase activity assayed without exogenous cAMP was higher in extracts from tissues exposed to histamine (39.8) than controls (31.2); in contrast, activity assayed in the presence of 5×10^{-6} M cAMP was slightly lower in extracts from histamine-exposed slices than in controls. 1,4-Methylhistamine (10^{-4} M) produced no significant changes in either the tissue level of cAMP or the (-cAMP/+cAMP) protein kinase activity ratio. The results suggest that protein kinase activation is involved in the cAMP-mediated action of histamine on the gastric fundic mucosa.

6961 PARIETAL CELL VAGOTOMY IN DOGS: INFLUENCE ON HEIDENHAIN POUCH ACID SECRETION, SERUM GASTRIN CONCENTRATION, GASTRIC EMPTYING AND MOTILITY. (Eng.) Bone, J.; Brandsborg, O.; Brandsborg, M.; Mikkelsen, K.; Eriksen, P. O.; Amdrup, E. (Kommunehospitalet, 8000 Arhus C, Denmark). *Digestion* 12(4/6):201-208; 1975.

The relations of Heidenhain pouch secretion (i.e., antral hyperfunction) and serum gastrin in six dogs during fasting, after feeding, and before and after parietal cell vagotomy (PCV) were investigated. Gastric motility and emptying were also investigated in the same dogs. There were no significant changes in gastric emptying time before and after the operation. There was a mean 37% increase in the 24-hr Heidenhain pouch secretion following PCV, and this was statistically significant ($p<0.05$) compared to the period before PCV. There was no significant difference between the mean fasting pouch secretion 18 hr before PCV (0.002 mEq/30 min) and that 18 hr after PCV (0.006 mEq/30 min); the mean secretion between the 5th and 10th hr after feeding before PCV (0.025 mEq/5 hr) was not significantly different from that after PCV (0.028

mEq/5 hr). There was a 75% increase in the 5-hr food-stimulated Heidenhain pouch secretion after PCV ($p<0.05$). The increase in pouch secretion after PCV took place mainly in the first 2 hr after the meal. The food-stimulated serum gastrin concentration was also significantly increased after PCV. The maximum serum gastrin concentration was reached at 15 min after feeding, before as well as after PCV. The maximum Heidenhain pouch acid secretion was reached later, at 120 min before and at 90 min after surgery. A significant positive correlation was found between the increase in maximum serum gastrin concentration and Heidenhain pouch secretion after PCV, indicating that up to 80% of the increase in acid output can be explained, yet not necessarily caused, by variations in serum gastrin concentration.

6962 KREBS CYCLE AND H^+ SECRETION IN AMPHIBIAN GASTRIC MUCOSA [Abstract]. (Eng.) Chacin, J.; Rincon, R.; Inciarte, D.; Canizales, A. (Zulia Univ. Sch. Medicine, Maracaibo, Venezuela). *Biophys. J.* 16(2, Part 2):129a; 1976.

6963 SIGNIFICANCE OF RETURN IONIC PATHWAYS OF THE SECRETORY MEMBRANE OF FROG GASTRIC MUCOSA IN Cl^--FREE MEDIA [Abstract]. (Eng.) Holloman, T. L.; Schwartz, M.; Dinno, M. A.; Carrasquer, G. (Dept. Applied Mathematics, Physics, and Medicine, Univ. Louisville, Louisville, KY 40208). *Biophys. J.* 16(2, Part 2):129a; 1976.

6964 RELATION BETWEEN GASTRIC SECRETION AND BLOOD CIRCULATION OF GASTRIC MUCOSA [Abstract]. (Eng.) Omata, S.; Sajima, T. (Keio Univ., Sch. Medicine, Keio, Japan). *Gastroenterol. Jpn.* 10(3):228; 1975.

6965 Ba^{2+} INHIBITION OF "NON-ACIDIC" Cl-SECRETION BY PIGLET GASTRIC MUCOSA [Abstract]. (Eng.) Machen, T. F.; Forte, J. G. (Physiological Lab., Downing St., Cambridge, England). *Biophys. J.* 16(2, Part 2):129a; 1976.

6966 EFFECT OF BULBAR ACIDIFICATION ON GASTRIC ACID RESPONSES TO URECHOLINE IN PAVLOV POUCH DOGS. (Eng.) Nilsson, G. (Dept. Pharmacology, Karolinska Institutet, Stockholm, Sweden). *Acta Physiol. Scand.* 95(3):258-262; 1975.

6967 STIMULUS-SECRETION COUPLING IN THE HUMAN AND CANINE STOMACH: ROLE OF HISTAMINE [Abstract]. (Eng.) Lorenz, W.; Troidl, H.; Schulz, S.; Becker, H.; Dormann, P.; Schmal, A.; Meyer, R.; Kusche, J.; Barth, H.; Rohde, H. (Dept. Experimental Surgery, Universitatsklinik, Marburg/Lahn, W. Germany). *Digestion* 13(1/2):115-116; 1975.

6968 THE EFFECTS OF METIAMIDE ON GASTRIC SECRETION AND STRESS ULCERATION IN RATS. (Eng.) Dai, S.; Ogle, C. W.; Lo, C. H. (Dept. Pharmacology, Univ. Hong Kong, Hong Kong). *Eur. J. Pharmacol.* 33:277-282; 1975.

6969 EFFECTS OF GROWTH HORMONE-RELEASE INHIBITING HORMONE (GH-RIH OR SOMATOSTATIN) ON SECRETORY PROCESSES IN STOMACH AND PANCREAS [Abstract]. (Eng.) Albinus, M.; Case, R. M.; Reed, J. D.; Shaw, B.; Smith, P. A.; Gomez-Pan, A.; Hall, R.; Besser, G. M.; Schally, A. V. (Univ. Medical Sch., The Univ., Newcastle upon Tyne, England). *Digestion* 13(1/2):105; 1975.

6970 STIMULATION OF ACID SECRETION IN THE ISOLATED GUINEA-PIG STOMACH WITH THEOPHYLLINE AND A CALCIUM IONOPHORE [Abstract]. (Eng.) Canfield, S. P.; Spencer, J. (St. Mary's Hosp. Medical Sch., London, W2 1PG, England). *J. Physiol.* 256(1):49P-50P; 1976.

6971 IS THE BASAL ACTIVITY OF RAT STOMACH HISTIDINE DECARBOXYLASE AFFECTED BY ANTRECTOMY [Abstract]? (Eng.) Hakanson, R.; Leidberg, G.; Rehfeld, J. F. (Dept. Pharmacology and Surgery, Univ. Lund, Solvegatan 10, S-221 85 Lund, Sweden). *Experientia* 31(12):1398-1399; 1975.

6972 EFFECT OF HYPERALIMENTATION ON DUODENAL AND PANCREATIC SECRETION [Abstract]. (Eng.) Adler, M.; Pieroni, P. L.; Takeshima, T.; Nacchiero, M.; Rudick, J.; Dreiling, D. A. (Mount Sinai Sch. Medicine, City Univ., New York, NY). *Biol. Gastroenterol. (Paris)* 9(Suppl. 1):56-57; 1976.

See also, 6915, 6923, 6942, 6954, 7095, 7096, 7187, 7233, 7244, 7261.

SECRETION AND METABOLISM

Pancreas

6973 SECRETION OF NEW DIGESTIVE ENZYME BY PANCREAS WITH MINIMAL TRANSIT TIME. (Eng.) Rothman, S. S. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *Am. J. Physiol.* 230(6):1499-1503; 1976.

Radioactive leucine was added to whole rabbit pancreas *in vitro* to determine whether the digestive enzymes in acinar cell cytoplasm come from the ribosomes. A small amount of labeled digestive enzyme was secreted within 5 min after adding 25 µCi L-^{14}C-leucine to the isolated gland. This rapid secretion of labeled protein suggests that some new protein is able to bypass intracellular storage pools and is secreted immediately. The secretion of protein overall was inversely related to labeled protein secretion. The average contribution of protein that was secreted immediately to total protein secretion was calculated to be a mean of 2.5%. The mean transit time for the secretion of new protein was estimated to be 2.2 min. When methacholine chloride (1.0 mg/100 ml) was added to the bathing medium, the rate of secretion of the labeled protein was decreased by half. The results are consistent with the hypothesis that this rapidly secreted protein comes directly from the ribosomes via the cytoplasm.

6974 THE ROLE OF EXTRACELLULAR Ca^{2+} AND CYCLIC NUCLEOTIDES IN THE MECHANISM OF ENZYME SECRETION FROM THE CAT PANCREAS.

(Eng.) Schulz, I. (Max-Planck-Institut fur Biophysik, Kennedyallee 70, D-6000 Frankfurt am Main, W. Germany). *Pfluegers Arch.* 360:165-181; 1975.

The role of Ca^{2+}, cyclic AMP (cAMP), cyclic guanosine monophosphate (cGMP), and their dibutyryl analogs on the enzyme secretion from the isolated, perfused pancreas of the cat were studied, along with the interrelation of Ca^{2+} and these nucleotides. Enzyme secretion was stimulated by single rapid injections of several different volumes (amounting to 14-102 μmol Ca^{2+}) of a 110 mM $CaCl_2$ solution; 0.43 U pancreozymin; 65 ng acetylcholine; 4.3 μmol each of dibutyryl cyclic AMP (dbcAMP), dbcGMP, cAMP, ATP, and ADP; 4.7 mol theophylline; and 25 or 47 mol of a 110 mM EGTA solution. Atropine sulfate (10^{-6} M) was also added to the perfusion solution. There was a linear relation between protein or amylase output and the peak Ca^{2+} concentration in the effluent perfusate of 18 mEq/l, which corresponds to a Ca^{2+} ion activity of 14 mEq/l. With higher doses of $CaCl_2$, responses were in the same range as those elicited by injections of acetylcholine or pancreozymin, which have half the maximal stimulation of enzyme secretion. Injections of Ca^{2+} potentiated the effects of dbcAMP, dbcGMP, or theophylline. Infusion of low doses of pancreozymin (0.025 U/min) increased the Ca^{2+} effect by 260%. The findings indicate that extracellular Ca^{2+} is involved in the mechanism of enzyme secretion and that Ca^{2+} and cyclic nucleotides have a synergistic action on the isolated, perfused cat pancreas.

6975 THE RELATION BETWEEN BILE AND PANCREATIC SECRETION IN DOGS AFTER ADMINISTRATION OF A SUB-MAXIMAL DOSE OF 2-DEOXY-D-GLUCOSE.

(Ger.) Nowak, W.; Sill, U.; Lippert, H.; Reding, R. (Chirurgische Klinik, Ernst-Moritz-Arndt-Universitat, Greifswald, E. Germany). *Scr. Med.* 48(6/7):463-473; 1975.

The effect of 2-deoxy-d-glucose (DG) on the interrelation between bile and pancreatic secretion was examined. Five dogs received 50 mg DG, i.v., and the pancreatic, duodenal, and gastric juice was collected for 150 min via Y cannulation 21 days after the appropriate end-to-end anastomosis. At 15-min intervals, under fasting conditions, the duodenal bilirubin (mg) was significantly correlated (p=0.01) with pancreatic secretion (ml), protein (mg), and HCO_3 (μEq); the correlation of protein in pancreatic secretion and duodenal bilirubin was most prominent, with a regression coefficient of 0.460. Gastric secretion was elevated about 700% over basal levels, 60 min after DG treatment; pancreatic and duodenal secretion rose or fell indifferently. At 15-min intervals after DG administration, duodenal bilirubin (mg) correlated significantly with pancreatic secretion (p=0.05), protein (mg) in pancreatic secretion (p=0.01), and HCO_3 (μEq, p=0.05); the protein-bilirubin correlated especially highly, with a regression coefficient of 0.535. This outcome suggests that more protein is released in pancreatic secretion after vagal stimulation with DG in response to a certain amount of bile (bilirubin). The average duodenal pH during the experiment was 7.0 (5.03-8.07), which excludes acid-associated endogenous secretin liberation. Accordingly, it is probable that duodenal gastrin secretion is the mediator of bile stimulation of pancreatic secretion.

6976 ON THE INTERACTIONS BETWEEN PANCREATIC LIPASE AND COLIPASE AND THE SUBSTRATE, AND THE IMPORTANCE OF BILE SALTS.

(Eng.) Borgstrom, B. (Dept. Physiological Chemistry, Univ. Lund, Lund, Sweden). *J. Lipid Res.* 16(6):411-417; 1975.

The effect of bile salts on the interactions among pancreatic lipase and colipase and the substrate tributyrin (TB) was investigated. Lipase (10 pmol), colipase, (50 pmol), or both were preincubated with 500 μl of TB in 15 ml pH 7.0 buffer in the absence or presence of 4 mM deoxycholyltaurine (DCT). Similar experiments in which hexadecane was substituted for TB and the pH was varied (4.5-9.0) were performed. At pH 7, bile salts prevented the binding of lipase to its substrate, but colipase in the substrate-water interface promoted lipase binding. The results suggest that lipase has an affinity for and binds to hydrophobic interfaces with partial irreversible inactivation. Bile salts in the range of micellar concentrations and above pH 6.5 displaced lipase from this binding, resulting in a reversible inactivation. At pH below 6.5, lipase bound strongly to the substrate even in the presence of bile salts, and a low activity peak was seen around pH 5.5. This is the result of binding to the substrate interface or "supersubstrate," and the activity of the catalytic site. With bile salts, colipase promotes the binding of lipase to this supersubstrate but not to other hydrophobic interfaces, and catalytic activity is reestablished. Kinetic data indicate that the binding between colipase and lipase in the presence of substrate is strong and is stoichiometric.

6977 A MODEL TO STUDY ACUTE PANCREATITIS IN THE DOG.

(Eng.) Musa, B. E.; Nelson, A. W.; Gillette, E. L.; Ferguson, H. L.; Lumb, W. V. (Surgical Lab., Dept. Clinical Sciences, Coll. Veterinary Medicine and Biomedical Sciences, Colorado State

Univ., Fort Collins, CO 80523). *J. Surg. Res.* 21 (1):51-56; 1976.

An acute pancreatitis model was developed in the dog that was consistently lethal and that allowed assessment of the excretory function of the pancreas without catheterization of the pancreatic ducts. The minor pancreatic duct was ligated and cut; a modified Thomas cannula was inserted in the duodenum opposite the major pancreatic duct and exteriorized on the right ventrolateral abdominal wall. This allowed production of pancreatitis by retrograde injection of a bile-trypsin mixture in the major duct. The minimum lethal dose of this mixture, determined in 22 dogs, was 1.02 ml of bile/kg body weight (it was uniformly fatal within 24 hr); there were 2000 U trypsin in each 1 ml of bile used. Injection of this mixture into the major pancreatic duct resulted in severe damage to approximately 38% of the gland. A plastic sleeve was inserted into the cannula during collections of pancreatic juice, isolating the pancreatic duct from the intestine. Secretions could be collected without significant contamination by intestinal content, and minimum cooperation was required from the dog. When the cannula is installed properly, there is no leakage and the dogs tolerate its presence without the need for retraining devices or restriction of activity postsurgery.

6978 ISOLATED PERFUSED RAT PANCREAS AS AN EXPERIMENTAL MODEL FOR THE STUDY OF PANCREATIC SECRETAGOGUES: EFFECTS OF SECRETIN, CCK-PZ, AND VIP [Abstract]. (Eng.) Tourant, R., Estival, A.; Vaysse, N.; Ribet, A. (Groupe de Recherche de Pathologie Digestive, C.H.U. Rangueil L 3, F 31400 Toulouse, France). *Biol. Gastroenterol. (Paris) enterol. (Paris)* 9(Suppl. 1):70-71; 1976.

6979 ROLE OF DOPAMINERGIC MECHANISM IN THE EXOCRINE SECRETION OF THE PANCREAS [Abstract]. (Eng.) Bastie, M.; Vaysse, N.; Pascal, J.-P.; Ribet, A. (Groupe de Recherche de Pathologie Digestive, C.H.U. Rangueil L 3, F 31400 Toulouse, France). *Biol. Gastroenterol. (Paris)* 9(Suppl. 1): 65-66; 1975.

6980 IS THERE A PLACE FOR MICROFILAMENTS IN PANCREATIC ENZYME SECRETION [Abstract]? (Eng.) Beaudoin, A. R.; Dunnigan, J.; Morisset, J. (Unite de Recherche Gastrointestinale, Univ. de Sherbrooke, Sherbrooke, P.O. J1K 2R1, Canada). *Digestion* 13(3):163; 1975.

6981 SYNTHESIS OF SECRETORY PROTEIN IN THE RAT PANCREAS AFTER FEEDING SOYBEAN FLOUR [Abstract]. (Eng.) Dijkhof, J.; Poort, S. R.; Poort, C. (Lab. Histology and Cell Biology, State Univ., Utrecht, Netherlands). *Biol. Gastroenterol. (Paris)* 9(Suppl. 1):72; 1976.

6982 EFFECTS OF BOMBESIN AND LITORIN ON THE RAT EXOCRINE PANCREAS: COMPARISON WITH CAERULEIN, CARBAMOYLCHOLINE AND SECRETIN. (Eng.) Robberecht, P.; Deschodt-Lanckman, M.; DeNeef, P.; Lammens, M.; Christophe, J. (Laboratoire de Chimie biologique et de la Nutrition, Univ. libre de Bruxelles, Brussels, Belgium). *Arch. Int. Physiol. Biochim.* 83(5):993-994; 1975.

See also, 6969, 6972, 7028, 7079, 7397.

SECRETION AND METABOLISM

Hepatobiliary Tract

6983 SIMILARITIES OF THE GOLGI APPARATUS MEMBRANE AND THE PLASMA MEMBRANE IN RAT LIVER CELLS. (Eng.) Hodson, S.; Brenchley, G. (Unit of Electron Microscopy, Welsh Natl. Sch. Medicine, Heath Park, Cardiff CF4 4XN, United Kingdom). *J. Cell Sci.* 20(1):167-182; 1976.

The protein subunit compositions of a Golgi apparatus-rich fraction (G fraction) and a plasma membrane-rich fraction (PM fraction) prepared from a common homogenate of Wistar rat liver are compared. The G fraction was collected in the density range 1.108 to 1.137 g/cm^3 and the PM fraction was collected in the 1.154 to 1.175 g cm^{-3} range. The homogenate and all fractions were assayed for enzymic activity. The G fraction had the characteristics of high yield and high purity. Galactosyltransferase activity was mainly confined (>95%) to the G fraction. Most of the remaining activity was found in the intermediate fraction. The yield of membrane protein in the G fraction was 2.26 mg protein/g liver. Electron microscopic examination of many sections confirmed the purity of the G fraction. The PM fraction showed no visual or enzyme activity parameters similar to the G fraction. Galactosyltransferase activity was nearly undetectable and was <1%

of the specific activity of the G fraction. Gel electrophoresis of the two fractions showed a close similarity, and in 1/12 cases, a complete identity of the protein subunit patterns. The identity consisted of not only of the R_f values but also of each of the seven major band's staining capacity with Coomassie brilliant blue. It is suggested that there is an intimate relation between the two membranes.

6984 THE EXISTENCE OF A SECOND ROUTE FOR THE TRANSFER OF CERTAIN GLYCOPROTEINS FROM THE CIRCULATION INTO THE LIVER.

(Eng.) Stockert, R. J.; Morell, A. G.; Scheinberg, I. H. (Div. Genetic Medicine, Dept. Medicine, Albert Einstein Coll. Medicine, Bronx, NY 10461). *Biochem. Biophys. Res. Commun.* 68(3):988-993; 1976.

The existence in rats of a second route by which at least one modified glycoprotein, in which N-acetylglucosaminyl residues have been made terminal, is transferred rapidly from the circulation into the liver is described. Male albino rats (250-300 g) were inoculated i.v. with ^{125}I-labeled orosomucoid (OR; α_1-acid glycoprotein) derivatives (5 μg), with or without the addition of an unlabeled glycoprotein (5 mg). The intravascular survival time of the various glycoproteins was determined every 3 min up to 27 min, and radioactivity was assayed in the blood, liver, and kidneys 15 min after injection. The physiological half-life of labeled asialo-OR was between 1 and 2 min, but the simultaneous infusion of unlabeled asialo-OR prolonged the half-life to 37 min by overloading the removal route. The same effect was seen with agalacto-OR. The infusion of unlabeled agalacto-OR negligibly lengthened the half-life of ^{125}I-labeled asialo-OR. In the reciprocal experiment, unlabeled asialo-OR affected the half-life of labeled agalacto-OR insignificantly. The agalacto derivatives of ceruloplasmin (CPN) and OR differed with respect to the duration of their intravascular survival, in contrast to the asialo derivatives of both proteins. Fifteen minutes after injection, 43% of agalacto-CPN, but only 4% of agalacto-OR, remained in the blood; asialo-CPN and asialo-OR were removed from the circulation and taken up by the liver to the same extent. Since the carbohydrate chains of agalacto-OR, from which sialic acid and galactose were sequentially removed, terminate in N-acetylglucosaminyl residues, it is assumed that there is a second hepatic receptor specific for glycoproteins terminating in these residues. This hypothesis is consistent with the fact that only a small proportion of injected, labeled ahexosamino-OR is transferred into the liver and almost half of it is found in the kidneys.

6985 SEPARATION OF KUPFFER AND ENDOTHELIAL CELLS OF THE RAT LIVER BY CENTRIFUGAL ELUTRIATION.

(Eng.) Knook, D. L.; Sleyster, E. Ch. (Inst. Experimental Gerontology TNO, Rijswijk, Netherlands). *Exp. Cell Res.* 99(2):444-449; 1976.

A separation procedure for purified fractions of Kupffer cells on endothelial cells is described and the distribution of some lysosomal enzymes was measured. Nonparenchymal liver cells were isolated from 3-month-old female BN/BiRij rats and were separated by centrifugal elutriation into two fractions consisting of structurally intact Kupffer and endothelial cells with purities of 91 and 95%, resp. Purified Kupffer and endothelial cells showed nearly equal specific activities for the lysosomal enzyme, acid phosphatase (86.6 ± 4.8 and 97.5 ± 7.6 mg protein, resp.); the specific activity of cathepsin D was about three times higher in Kupffer cells (18.0 ± 2.9 versus 6.1 ± 1.2 mg protein). Based on the protein contents of Kupffer and endothelial cells per g of liver (1.48 mg protein and 1.70 mg protein, resp.) and on the threefold difference in their cathepsin D activities, about 13% of the total cathepsin D activity in the liver is present in Kupffer cells, which represent only 0.7% of the total amount of liver protein. The selective enrichment of cathepsin D, the most important lysosomal enzyme for protein degradation, in Kupffer cells is in full agreement with the important function of Kupffer cells in the clearance of foreign substances from the circulation.

6986 HEPATIC NUCLEASES: EXTRAHEPATIC ORIGIN AND ASSOCIATION OF NEUTRAL LIVER RIBONUCLEASE WITH LYSOSOMES.

(Eng.) Bartholeyns, J.; Peeters-Joris, C.; Baudhuin, P. (U.C.L. 7539 Avenue Hippocrate 75, B-1200 Brussels, Belgium). *Eur. J. Biochem.* 60(2):385-393; 1975.

In view of the neutral pH optimum of neutral liver ribonuclease and of some particularities of its distribution in fractionation experiments, the possibility of an extrahepatic origin of neutral RNase was investigated in rats. Three days following partial pancreatectomy, average decreases in neutral RNase activities were 41% and 29% in the serum and liver, resp. This effect was specific, because no effect was observed on acid RNase, DNase, and acid phosphatase. Following the i.v. injection of 10,000 U of labeled bovine RNase A, some of the enzyme was found to accumulate in the liver, the maximal concentration occurring 1 day after the injection. Because of the rapid elimination of the exogenous enzyme in the urine, only 0.1% of the injected enzyme was found in the liver. The specific radioactivity was higher than expected, 0.6% of the radioactivity being recovered in the liver. Rats were injected with a mixture containing labeled bovine RNase (3,500 U), horseradish peroxidase (80,000 U), invertase (2,000 U), and Triton WR-1339 (1 g/kg) 1 day before sacrifice. Radioactivity associated with exogenous RNase, peroxidase, and invertase had similar distributions, with median equilibrium densities of 1.1820, 1.1754, and 1.1824 g/ml, resp. The corresponding values for acid phosphatase and neutral RNase activity were 1.1504 and 1.2001 g/ml, resp. Uptake of neutral RNase from the plasma could explain the behavior of this enzyme after Triton WR-1339 treatment. Both lysosomal enzymes and neutral RNase were fully activated by hypoosmotic shock and by the addition of digitonin (0.015 mg/mg protein) to the suspension medium, suggesting that the major part of liver neutral RNase is associated with the lysosomal system. These results show that neutral liver RNase is associated with lysosomes, and that this localization is a consequence of the uptake of the enzyme from blood plasma by the liver.

6987 SUBCELLULAR DISTRIBUTION OF s-ADENOSYLMETHIONINE DECARBOXYLASE IN RAT LIVER: EVIDENCE OF DECARBOXYLATION OF s-ADENOSYLMETHIONINE SEPARATE FROM SYNTHESIS OF SPERMIDINE. (Eng.)

Sturman, J. A. (Inst. Basic Res. Mental Retardation, Staten Island, NY). *Biochim. Biophys. Acta* 428(1): 56-69; 1976.

The subcellular distribution of *S*-adenosylmethionine decarboxylase activity was investigated in rat liver homogenates, and the enzyme activity was also determined in supernatant fractions of liver homogenates of various species. Liver homogenates from guinea pig, rabbit, chicken, frog, monkey, and human had no sedimentable *S*-adenosylmethionine decarboxylase activity, whereas homogenates from rat, mouse, gerbil, and ferret all had a fraction of activity, which was only released into the supernatant fraction by Triton X-100. Subcellular fractionation of rat liver homogenates revealed that 79.4% of the *S*-adenosylmethionine decarboxylase activity was located in the crude nuclear fraction, while 18.8% occurred in the supernatant fraction. This distribution was not paralleled by the activity of the cytoplasmic enzyme lactate dehydrogenase. The finding of essentially unchanged nuclei in the crude nuclear fraction of a rat liver homogenate prepared in sucrose containing 1% Triton X-100 indicated that the activity was not associated with nuclei, since this fraction contained no activity of *S*-adenosylmethionine decarboxylase. Purified preparations of rat liver nuclei contained little or no detectable activity of *S*-adenosylmethionine decarboxylase, confirming that the activity present in the crude nuclear fraction is not associated with the nuclei, and suggesting that it is associated with the membrane fragments. The large portion of *S*-adenosylmethionine decarboxylase activity, located in the crude nuclear fraction of the rat liver homogenate, was not accompanied by any activity of spermidine synthase. This suggests the existence of an enzyme that decarboxylates *S*-adenosylmethionine and yet does not synthesize spermidine.

6988 ESTROGEN RECEPTOR IN THE MAMMALIAN LIVER. (Eng.)

Eisenfeld, A. J.; Aten, R.; Weinberger, M.; Haselbacher, G.; Halpern, K.; Krakoff, L. (Yale Univ. Sch. Medicine, New Haven, CT 06510). *Science* 191(4229):862-865; 1976.

^{3}H-estradiol binding proteins were found in the supernatant fraction of adult mammalian livers. The supernatant fractions of liver homogenates obtained from adult female Charles River CD rats were incubated with 2×10^{-9} M radioactive estradiol for 1 hr. Six percent of the ^{3}H-estradiol was bound. The addition of nonradioactive estrogens to the incubation medium reduced the binding of the labeled estradiol, while androgens, progesterone, and glucocorticoids did not. The most effective competitors were estradiol, 17α-ethinyl estradiol, and diethylstilbestrol, which reduced the binding to 8.5%, 6.6%, and 10% of the controls, resp. These results indicate that the estradiol binding in the liver is highly estrogen-specific. Radioactive estradiol was incubated with liver slices, and the macromolecular binding in the supernatant and in an extract of highly purified nuclei was measured. Temperature-dependent macromolecular binding in the nucleus was found to be present, the mean level of bound radioactivity in the nucleus at 0 C being 1,400 disintegrations/min (dpm) and that at 25 C being 5,800 dpm. The incubation of liver supernatant, which had previously been incubated with ^{3}H-estradiol, with crude liver chromatin preparations revealed that macromolecular binding to chromatin was dependent on supernatant binding in a temperature-related process. Macromolecules with high affinity for binding estrogen were also found in the liver supernatants of the mouse, rabbit, and green monkey. The binding of estradiol in the liver supernatant was much lower in 27-day-old female rats than in adult rats. When adult and prepubescent female rats received 17α-ethinyl estradiol (100 μg, s.c.), the concentration of the plasma protein renin substrate was increased several-fold in the adults, but was only slightly changed in the prepubescent rats. The estrogen-binding macromolecule in the liver supernatant may be an estrogen receptor that modulates hepatic synthesis of plasma proteins and may be involved in mediating the serious side effects seen in women using estrogen-containing contraceptives.

6989 SYNTHESIS AND HALF-LIFE OF A SERUM FACTOR IN NORMAL AND TUMOR-BEARING ANIMALS.

(Eng.) Dolan, M. L.; Sudbury, B.; Ove, P. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *J. Natl. Cancer Inst.* 56(6):1261-1267; 1976.

A serum factor found in normal rats is known to disappear from the sera of hepatoma-bearing rats and rats maintained on a low-protein diet; the hypothesis that this factor is synthesized in the liver in normal and hepatoma-bearing rats and disappears because of an increased demand for it by the growing number of hepatoma cells was tested. Normal and Morris hepatoma 7777-bearing male BUF rats received a 10-min pulse of ^{3}H-leucine (100 μCi/100 g, i.v.). The mean rate of synthesis of the serum factor in the host liver after 10 min (23.1 counts/min/μg) was twice that found in the normal liver (11.5 counts/min/μg), despite very low levels in the sera of tumor-bearing animals. The counts recovered in the serum factor-antibody complex were not due to nonspecific binding, as indicated by the absence of counts when the animals were given cycloheximide (2 mg/100 g) 10 min prior to the injection of ^{3}H-leucine. All the counts from the complex were associated with the 39,000 molecular weight band, representing factor subunits after sodium dodecyl sulfate gel electrophoresis. About twice as much serum factor was associated with the microsomes of the host liver (8.8 μg serum factor/mg microsomal protein) as with those of the normal liver (4.6 μg/mg). Half-lives of the serum factor and total serum protein were determined using an antifactor immunoglobulin G affinity column. The half-life of the total serum protein was 2 days in normal rats and 2.9 days in hepatoma-bearing animals; the half-life of the serum factor was 23 hr in normal rats but only 9 hr in hepatoma-bearing ones. This rapid disappearance of the factor from the circulating blood, despite an increased synthesis, accounts for the complete absence of the factor in the sera of hepatoma-bearing animals with tumor weights larger than the liver weights.

6990 HEPATOCYTE PERFUSION WITHIN A CENTRIFUGE. (Eng.) Eiseman, B.; Norton, L.; Kralios, N. C. (Denver General Hosp., Denver, CO). *Surg. Gynecol. Obstet.* 142(1):21-28; 1976.

The use of RBC washing centrifuge units as perfusion chambers for hepatocyte suspensions being evaluated for potential extracorporeal liver support is described. Two types of centrifuge unit were used, a unit requiring intermittent perfusion and a continuous-flow unit. With the former unit, 30-190 g of living hepatocytes from pigs were perfused with 900-1,000 ml of 100% cell-free oxygenated (pO_2, 300 mm Hg) swine serum. Cell viability, as reflected by trypan blue exclusion, both started and remained above 90% in 6 of 11 experiments. However, $2\text{-}^{14}C$-labeled pyruvate metabolism progressively deteriorated during the 2- to 3-hr perfusion experiments. In addition, oxygen consumption began a progressive deterioration as the hypoxic cells failed to survive on their intermittent supply of oxygenated perfusate. In contrast, a continuous-flow unit could, at a flow of 800 ml of human plasma per min, support most functions of 100 g of pig hepatocytes for 6 hr, and some functions for 12 hr. In 12 of 18 experiments, trypan blue viability remained above 85%, and this included one experiment lasting 12 hr. In three studies, an initial low viability of 20-70% increased to above 95% within 15 min of perfusion and remained at that level throughout the experiment. The rate of $2\text{-}^{14}C$-labeled pyruvate metabolism decreased progressively in each study; by the 2nd-4th hour, the metabolism was above 50% of the initial rate in two experiments, less than 50% in five studies, less than 25% in five studies, and less than 10% in one study. At 15 min of perfusion, the mean oxygen consumption was 35% of the theoretic normal of 0.04 ml O_2/g hepatocytes/min. Thereafter, the mean peak utilization was 74% at 78 min. The results show that the oxygen needs of hepatocytes are so great, and the dissolved oxygen in plasma is so small, that a continuous perfusion unit is necessary to avoid lethal levels of hypoxia. A centrifuge allowing constant perfusion of oxygenated plasma into hepatocytes kept within the unit by centrifugal force is a suitable base for extracorporeal liver support.

6991 HEPATIC PROLYL HYDROXYLASE ACTIVITY IN EXPERIMENTAL CIRRHOSIS. (Eng.) McPhie, J. L.; Short, L. T. (Dept. Pathology, Univ. Aberdeen, Aberdeen, Scotland). *Acta Hepatogastroenterol. (Stuttg.)* 22(6):387-391; 1975.

Hepatic collagen synthesis was investigated during progressive fibrosis induced by carbon tetrachloride (CCl_4) in male Sprague-Dawley rats by determining the prolyl hydroxylase activity and hydroxylproline levels and assessing the fibrosis morphologically. Hepatic cirrhosis was induced within 4 weeks by periodic inhalation of CCl_4 vapor. Prolyl hydroxylase activity and hydroxylproline content were estimated at various times. When compared with the morphological features, enzyme activity became elevated when hepatocellular necrosis supervened upon the initial features of fatty change in the hepatocytes (week 2). Thereafter, activity increased with progression to visible fibrosis (at 2.5 weeks) and ultimate cirrhosis (at 3.5 weeks) and remained elevated, reaching a maximum (745 cpm/mg protein) over three times the control value after 5 weeks. Hydroxylproline levels lagged behind the increasing enzyme activity and were not significantly increased (to 8.2 μmol/mg wet weight) until week 3. The early elevation of hydroxylase activity at a time when the dominant feature is hepatocellular necrosis suggests that the collagen-stimulating factors recovered from mouse liver acutely damaged by CCl_4 ingestion may represent factors released from necrotic hepatocytes.

6992 HEPATIC ERYTHROPOIETIN: ENHANCED PRODUCTION IN ANEPHRIC RATS WITH HYPERPLASIA OF KUPFFER CELLS. (Eng.) Peschle, C.; Marone, G.; Genovese, A.; Magli, C.; Condorelli, M. (Istituto Patologia Medica, Nuovo Policlinico, Via S. Pansini, 80131 Naples, Italy). *Br. J. Haematol.* 32(1):105-111; 1976.

In an attempt to evaluate the role of the reticuloendothelial system (RES) as a possible source of erythropoietin (Ep), Ep levels were assayed in the serum of adult male Wistar rats subjected sequentially to the i.v. administration of colloidal carbon (1.0 ml/250 g, 4 days), zymosan (5 mg/200 g, 4 x), or their vehicles; sham operation or bilateral nephrectomy with and without subtotal hepatectomy; and hypoxia (0.45-0.40 atmospheres of air for 6 hr starting 1 hr after the operation). In anephric rats, colloidal carbon induced a significant potentiation of hypoxic Ep activity (26.48% ^{59}Fe-RBC incorporated) in comparison to that in controls receiving saline (13.73% ^{59}Fe-RBC incorporated) or the vehicle (14.46% incorporated). Zymosan also potentiated hypoxic Ep activity (15.62% incorporated), in comparison with the activity in the vehicle-treated animals (9.08% incorporated). Since the two agents did not apparently modify the kinetics of exogenous Ep, it is postulated that this phenomenon is mediated by enhanced extrarenal Ep production. Both colloidal carbon and zymosan induced hyperplasia of the RES. Moreover, subtotal hepatectomy almost abolished the Ep response to hypoxia evoked by zymosan. The correlation between hyperplasia of hepatic RES and enhanced Ep production in anephric rats primed with these agents suggests that Kupffer cells constitute a major source for extrarenal Ep. It is of interest that colloidal carbon and zymosan did not significantly modify the renal production of Ep.

6993 CIRCADIAN RHYTHM OF BILIARY EXCRETION AND ITS CONTROL MECHANISMS IN RATS WITH CHRONIC BILIARY DRAINAGE. (Eng.) Ho, K.-J.; Drummond, J. L. (Dept. Pathology, Univ. Alabama, Birmingham, AL 35294). *Am. J. Physiol.* 229(5):1427-1437; 1975.

The circadian rhythm of biliary excretion and its control mechanisms were investigated in Sprague-Dawley rats with chronic biliary drainage. Rats were kept under a rigid lighting schedule (light on at 6 a.m. and off at 6 p.m.) and fed either a standard diet (24 rats) or the diet supplemented with 2% cholesterol (8 rats). A permanent bile fistula was made in all rats, and the animals were divided into four groups: control (6), cholesterol-fed (8), vagotomy (8), and adrenalectomy (10). Vagotomy and adrenalectomy were performed at the same time as the fistula. The rats exhibited a remarkable circadian rhythm of bile flow, biliary concentrations, and excretory rates of bile salt, cholesterol, and phospholipid. The peak was attained at midnight and the nadir at noon, except for peak and nadir concentrations of cholesterol and phospholipid occurring at 8 p.m. and 8 a.m., resp. Cholesterol feeding abolished the circadian rhythm of biliary cholesterol and phospholipid concentrations, but not their excretory rates, because the daily fluctuation of the bile flow remained unchanged. Bilateral vagotomy enhanced the bile flow rate and shifted the peak for all parameters except bile salt to 4 hr earlier. Bilateral adrenalectomy abolished the rhythm of the concentration of cholesterol and phospholipid and minimized that of bile salt, but the daily fluctuation of their excretory rates persisted in a lower amplitude. The studies suggest that this circadian rhythm might be controlled simultaneously by multiple factors, as it could not be entirely abolished by any single special treatment.

6994 THE LYMPHATIC DRAINAGE OF THE LIVER CAPSULA AND HEPATIC PARENCHYMA. (Eng.)

Szabo, G.; Magyar, Z.; Jakab, F. (Zentralinstitut fur Traumatologie, H-1430 Budapest VIII, Mezo Imre ut 17, Hungary). *Res. Exp. Med. (Berl.)* 166(2): 193-200; 1975.

The lymphatics transport of bilirubin and of ^{131}I-albumin absorbed from the liver capsule was studied in dogs during the early stage of complete biliary obstruction by common bile duct occlusion. Bilirubin transport by the right lymph trunk (0.86 μg/min) was only 1.6% of that by the thoracic duct (51.49 μg/min). The total amount of bilirubin transported was 2.41 and 7.09 mg%, resp. Labeled albumin absorbed from the liver capsule was transported by both the right lymph and thoracic ducts. In a further series of experiments, labeled albumin was infused into the common bile duct under high pressure to open up nonfunctioning connections between the intraparenchymatous lymphatics and the superficial vessels. This procedure was repeated after ligation of the lymph vessels in the hepatic hilum. During the infusion, albumin was transported from the liver parenchyma almost exclusively by the thoracic duct. After the occlusion of about 70% of the lymphatics draining the liver, the increase in albumin transport by the right duct accounted for only an insignificant fraction of the loss from the thoracic duct lymph. It is concluded that lymph formed in the hepatic parenchyma is transported by vessels joining the thoracic duct. Capsular lymphatics run to both the thoracic and right lymph ducts. There is almost a complete division of function between the superficial and deep lymphatics of the liver.

6995 METABOLISM OF 1-^{3}H-ETHANOL BY ISOLATED LIVER CELLS. TIME-COURSE OF THE TRANSFER OF TRITIUM FROM *R,S*-^{3}H-ETHANOL TO LACTATE AND β-HYDROXYBUTYRATE. (Eng.)

Grunnet, N.; Thieden, H. I. D.; Quistorff, B. (Dept. Biochemistry A, Panuminstituttet, Blegdamsvej 3c, DK-2200, Copenhagen N, Denmark). *Acta Chem. Scand.* [*B*] 30(4):345-352; 1976.

The amount of acetaldehyde oxidized in the extramitochondrial cell compartment at physiological concentrations of acetaldehyde was investigated in the isolated liver cells of female Wistar rats. Parenchymal cells of 24-hr-fasted rats were incubated with 65 mM *R,S*-1-^{3}H-ethanol plus 3 mM pyruvate as substrates in the absence and presence of 4-methylpyrazole (1.7 mM). Metabolite levels and the time course of the transfer of tritium from ethanol to lactate and β-hydroxybutyrate was measured during the first 15 min of ethanol metabolism. The time course of the loss of tritium from 2-^{3}H-L-lactate and 3-^{3}H-β-D-hydroxybutyrate in identical experiments was also measured. The incorporation rate of tritium from ethanol into lactate and β-hydroxybutyrate decreased with time. The addition of 4-methylpyrazole decreased the incorporation rate roughly proportional to the decrease in ethanol and acetaldehyde metabolism. The incorporation rates of tritium to lactate were corrected for the detritiation rates measured in experiments with 2-^{3}H-L-lactate and 3-^{3}H-β-D-hydroxybutyrate as substrates. The rate of extramitochondrial acetaldehyde oxidation for the present experimental conditions was calculated from the corrected initial rates of incorporation of tritium into lactate to range from 0-0.4 μmol/min/ml of cells.

6996 INACTIVATION OF ALCOHOL AND RETINOL DEHYDROGENASES BY ACETALDEHYDE AND FORMALDEHYDE.

(Eng.) Grisolia, S.; Guerri, C.; Godfrey, W. (Dept. Biochemistry, Univ. Kansas Medical Center, Kansas City, KS 66103). *Biochem. Biophys. Res. Commun.* 66(4):1112-1117; 1975.

The significance of the effects of aldehyde following ethanol intoxication was pursued in experiments in which alcohol dehydrogenases from horse liver, rat liver, and human retina and retinol dehydrogenase from rat liver were incubated at 37 C with low concentrations of acetaldehyde (AA, 17 and 53 mM) and formaldehyde (FA, 3-29 mM). Activity was assayed at 0, 30, and 60 min. There was a rapid and progressive inactivation of alcohol dehydrogenase and retinol dehydrogenase by AA and FA. The aldehydes inactivated the alcohol dehydrogenase of human retina homogenates markedly; after 1 hr. the activity was reduced from 100% to 10% by 53 mM AA. The enzyme was more sensitive to AA and less sensitive to FA. However. the reverse was true with the liver enzymes--horse liver alcohol dehydrogenase activity was reduced to 10% by 17 mM FA. The effect of FA was tested on other dehydrogenases that contain sulfhydryl groups. Malic dehydrogenase (pig heart), like rat liver alcohol dehydrogenase, was markedly inactivated, but lactic dehydrogenase and glyceraldehyde-3-phosphate dehydrogenase (rabbit muscle) were more stable. To pinpoint the effect of FA on sulfhydryl groups, glutathione (GSH) was added to an incubation mixture containing horse liver alcohol dehydrogenase. High concentrations of GSH

(0.05 M) protected the enzyme against FA inactivation. Moreover, addition of 0.25 M GSH not only prevented further inactivation, it partially restored the activity. The experiments show the great sensitivity of alcohol and retinol dehydrogenases to aldehydes, levels of which can be high in humans after ethanol consumption.

6997 EFFECT OF ETHANOL INTAKE ON THE INCORPORATION OF LABELLED AMINO ACIDS INTO LIVER PROTEIN.

(Eng.) Morland, J.; Sjetnan, A. E. (Inst. Medical Biology, Univ. Tromso, N-9001 Tromso, Norway). *Biochem. Pharmacol.* 25(19):2125-2130; 1976.

The effect of ethanol on the incorporation of labeled amino acids into liver protein was studied in male Wistar rats receiving ethanol as approximately 30% of their total caloric intake. Sucrose or lipids replaced ethanol isocalorically in controls. Ten percent of the calories were usually provided by protein, except in one experiment in which both treated and control animals received 25% of their calories from protein. The diets were given for periods of up to 35 days. When ethanol replaced sucrose isocalorically, the incorporation of labeled amino acids into liver cell protein was reduced by 18.5% after treatment for 30 days, but not after treatment for 1 or 3 days. The reduced incorporation was present both in the presence of ethanol and 24 hr after the last intake of alcohol. When ethanol replaced lipids isocalorically, the same reduction of protein labeling was found as when sucrose was replaced, after treatment for 35 days. When both ethanol-treated and control animals were given a protein-rich diet for 35 days, ethanol treatment caused the same reduction of amino acid incorporation into protein, as when both groups were fed a low-protein diet. It is concluded that long-term ethanol treatment mediates a reduction of protein synthesis in the liver. This reduction requires some time to develop, is due to the inclusion of ethanol in the diet, and is not counteracted by a high-protein diet.

6998 THE EFFECT OF DIET AND ALCOHOL ON THE DEVELOPMENT OF FOLATE DEFICIENCY IN THE RAT.

(Eng.) McGuffin, R.; Goff, P.; Hillman, R. S. (Univ. Washington Medical Sch., Seattle, WA 98195). *Br. J. Haematol.* 31(2):185-192; 1975.

Studies of the rate of depletion of serum and tissue methylated and nonmethylated folates were conducted with female Sprague-Dawley rats maintained for long periods on either a folate-deficient diet or a folate-deficient diet plus high alcohol intake. Folate deficiency was induced by restricting animals to a liquid diet of 25% sucrose in water to which 100 mg succinylsulphathiazole/100 ml was added to suppress the intestinal production of folates. Constant blood ethanol levels of between 50 and 300 mg/dl were maintained for 3-4 weeks by the administration of 100 ml/kg of 10% ethanol in three or four divided doses through a surgically placed gastrostomy tube. Using this animal model, which closely resembles severe alcoholism in man, a rapid depression in 5-methyltetrahydropteroyl glutamates, one to seven (5-methyl H_4 PteGlu 1-7), was observed similar to that reported in alcoholic men. The serum values of these methylated folates in folate-starved animals treated with alcohol had fallen below 30% of the original value by the third day of treatment, while animals on folate-deficient, sugar-water diets maintained levels greater than 60% of the original value. This difference continued for 8 days, until the serum 5-methyl H_4 PteGlu values for both groups had fallen to below 30% of the original values. Ethanol did not alter the rate of depletion of liver methylated and nonmethylated folate stores from that observed in folate-starved, sucrose-water control animals. Whatever the effect of ethanol on serum 5-methyl H_4 PteGlu levels, the rapid depression in serum values is not related to a gross change in liver pool kinetics, such as a major block in the release of 5-methyl H_4 PteGlu from liver polyglutamate stores.

6999 AZATHIOPRINE HEPATOTOXICITY, DIRECT COMPLICATION OR SECONDARY EFFECT IN RAT LIVER TRANSPLANTATION.

(Eng.) Hess, F.; Jerusalem, C.; Polak, M. (Univ. Nijmegen, Lab. Cytology and Histology, Geert Grooteplein Noord 21, Nijmegen, Netherlands). *Eur. Surg. Res.* 8(2):156-165; 1976.

The risk of azathioprine-induced hepatocellular damage was investigated using an auxiliary liver iso- and allotransplantation model in PVG/C and Wistar rats. The model permits study of the drug effect on both the graft and the recipient livers, which are vascularized in different ways. Rats underwent allotransplantation (PVG/C to Wistar), isotransplantation (Wistar to Wistar), or subtotal (70%) hepatectomy plus ligation of the hepatic artery (Wistar). Treated rats received 10 mg/kg/day azathioprine (10 mg/kg/day, i.v.) for 20 days. Neither histopathological changes nor deaths directly attributable to drug toxicity to the hepatocytes were found. All livers of azathioprine-treated animals exhibited pronounced, but differing, morphological changes that depended on the surgical procedures and immunosuppressive therapy, if any. In the untreated isologous transplant group, the host liver exhibited temporarily scattered small foci of parenchymal necrosis, probably due to a high local concentration of biliary acids. Morphological lesions were absent in the treated and untreated subtotally hepatectomized rats with normal bile flow. Lesions did become manifest after reimplantation (grafts) and/or ligation of the common bile duct (hosts). It is concluded that in rats, azathioprine is toxic for hepatocytes only when the normal bile flow is impeded, independent of the type of liver vascularization.

7000 IMPAIRED LITHOCHOLATE SULFATION IN THE RHESUS MONKEY: A POSSIBLE MECHANISM FOR CHENODEOXYCHOLATE TOXICITY.

(Eng.) Gadacz, T. R.; Allan, R. N.; Mack, E.; Hofmann, A. F. (Dept. Surgery, Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205). *Gastroenterology* 70(6):1125-1129; 1976.

The ability of the rhesus monkey to sulfate a tracer dose of lithocholate during a single hepatic passage was investigated to determine lithocholate metabolism in this species. Radioactive lithocholase (5 μCi) alone or with 10 μCi 11,12-^{3}H-chenodeoxycholic acid or 10 μCi 11,12-^{3}H-sulfolithocholylglycine was administered i.v. to female monkeys with an exteriorized enterohepatic circulation, and the chemical form of biliary radioactivity was defined by thin-layer chromatography. A total of 70%-92% of injected radioactivity was recovered in the bile over 4 hr. Little radioactivity was excreted in urine. When conjugated lithocholate was injected, most biliary radioactivity (77%) was excreted in products having the chromatographic mobility of lithocholylglycine or lithocholyltaurine, indicating impaired sulfation relative to man. Only 17% had the mobility of sulfolithocholylglycine or sulfolithocholyltaurine. Sulfolithocholylglycine was excreted in the bile virtually unchanged, although 12.5% of the recovered radioactivity had the mobility of lithocholylglycine or lithocholyltaurine, suggesting some desulfation during hepatic passage. Chenic acid was excreted mostly (89%) as chenylglycine or chenyltaurine. Biliary composition by gas-liquid chromatography was largely cholate. These experiments indicate that the major bacterial biotransformation product of chenic acid is not readily sulfated, and probably not detoxified, in the female rhesus monkey as it is in man.

7001 EFFECTS OF CHRONIC ADMINISTRATION OF POLYBROMINATED BIPHENYLS ON PARAMETERS ASSOCIATED WITH HEPATIC DRUG METABOLISM.

(Eng.) Dent, J. G.; Netter, K. J.; Gibson, J. E. (Pharmakologisches Institut der Universitat D-6500 Mainz, W. Germany). *Res. Commun. Chem. Pathol. Pharmacol.* 13(1):75-82; 1976.

Parameters associated with hepatic microsomal drug metabolism were measured *in vitro* following the exposure of female Sprague-Dawley rats to polybrominated biphenyls (PBB) as a dietary supplement (4.69, 18.75, 75, and 300 ppm) for 2 weeks. The food consumption and growth rate of animals was not affected by PBB, but significant increases in hepatic drug metabolism over control levels were observed. The amount of microsomal protein was increased significantly to 152% of the control value, by both 75 and 300 ppm PBB in the diet ($p<0.05$). Cytochrome P_{450} was increased significantly to 158, 227, and 30% of the control values, by 18.75, 75, and 300 ppm PBB, resp. Cytochrome b_5 was increased to 184 and 205% of control values by the two higher concentrations, resp. The three highest concentrations caused significant increases in ethylmorphine-N-demethylase (230, 434, and 485% of controls, resp.), ethoxycoumarin-O-deethylase (463, 1,076, and 1,601% of controls, resp.), and benzo(a)pyrene hydroxylase (218, 936, and 1,303% of controls, resp.). All four concentrations caused significant increases in epoxide hydratase (134, 167, 211, and 256% of controls, resp.). The increases seen in NADPH-cytochrome c reductase were significant with 18.75 and 300 ppm PBB only (137 and 190% of controls, resp.), and the increases seen in aniline hydroxylase were significant only with 4.69, 75, and 300 ppm PBB (80, 199, and 268% of controls, resp.). The pattern of induction seen after PBB exposure was compared with those produced by phenobarbital (80 mg/kg) or 3-methylcholanthrene (20 mg/kg), which were administered i.p. 3 days prior to sacrifice. Phenobarbital produced significant increases in cytochrome P_{450}, NADPH-cytochrome c reductase, epoxide hydratase, aniline hydroxylase, ethylmorphine-N-demethylase, ethoxycoumarin-O-deethylase, and benzo(a)pyrene hydroxylase, but not in microsomal protein or cytochrome b_5. 3-Methylcholanthrene produced increases only in cytochrome P_{450}, aniline hydroxylase, ethoxycoumarin-O-deethylase, and benzo(a)pyrene hydroxylase. The two higher PBB concentrations, and both phenobarbital and 3-methylcholanthrene, produced a significant increase in the ratio of liver weight to body weight (111 and 144% of controls for 75 and 300 ppm PBB, resp.). The pattern of enzyme induction and spectral characteristics of the induced cytochrome P_{450} indicate that PBB may be similar to both the carcinogenic polycyclic hydrocarbons and the phenobarbital-like agents. PBB could affect the toxicity of other compounds.

7002 THE EFFECT OF A LONG-TERM CCl_4 ACTION ON THE DNA CONTENT OF RAT LIVER CELL NUCLEI. A CYTOPHOTOMETRIC STUDY.

(Eng.) Vitalis, B. (Dept. Biology, Univ. Medical Sch., Pecs, Hungary). *Folia Histochem. Cytochem. (Krakow)* 13(3/4):207-212; 1975.

The effect of long-term carbon tetrachloride (CCl_4) administration on the DNA content of rat liver cell nuclei was investigated in inbred CFY male and female rats. DNA values and ploidy distribution were correlated with the histopathological features of the liver tissue and with the sex of the animals. The animals were inoculated s.c. twice a week with a 50% solution of CCl_4 (0.13 ml/100 g body weight) for 12 weeks). DNA content per interphase nucleus was determined cytophotometrically. The degree of severity and histopathological signs of liver injury were more pronounced in males than in females. The females manifested fatty degeneration around the central veins without fibrosis, but the males developed cirrhosis. The cytophotometric DNA measurements revealed increased numbers of polyploid nuclei, with a mean amount of DNA per nucleus in the diploid range slightly greater than the control value. Two modal peaks were found, one in the diploid and one in the tetraploid range, with a simultaneous occurrence of remarkable numbers of over-tetraploid nuclei. Cell nuclei from normal liver showed a modal peak in the diploid range. There was no second peak in the tetraploid region. The histological patterns of the hepatic lesions varied accordingly to sex, but the ploidy distributions were similar in both sexes. There was no relation between DNA content and the type of histopathological change. The data show that after CCl_4 treatment, the amount of DNA per nucleus increased over the control value, and this was responsible for the appearance of a second peak in the tetraploid range. The ploidy changes in the cell nuclei agreed with previous experiments in which increased DNA synthesis and a high frequency of atypical mitoses were found after chronic CCl_4 intoxication.

7003 BILIARY EXCRETION OF ^{64}Cu, ^{65}Zn AND ^{203}Hg IN THE RAT WITH LIVER INJURY INDUCED BY CCl_4. (Eng.) Cikrt, M.; Tichy, M.; Holusa, R. (Inst. Hygiene Epidemiology, Srobarova 48, 100 42 Prague 10, Czechoslovakia). *Arch. Toxicol. (Berl.)* 34(3):227-236; 1975.

To investigate the possibility that the elimination of toxic metals might be altered in the CCl_4-damaged liver, the kinetics of biliary excretion and the distribution of ^{64}Cu, ^{65}Zn, and ^{203}Hg were studied in 48 female Wistar rats injected s.c. with CCl_4. The animals treated with ^{64}Cu or ^{65}Zn received CCl_4 (1 ml/kg) twice weekly for 3 months, and eight of these rats received an aqueous solution, i.v., of ^{203}Hg 1 month after the CCl_4 exposure was terminated. In addition, BSP excretion was determined in 10 CCl_4-exposed rats and 5 controls. The mean BSP excretion in the rats exposed to CCl_4 was prolonged (6.23 min) in comparison to controls (4.13 min). The mean cumulative biliary excretion of ^{65}Zn, 24 hr after the administration of $^{65}ZnCl_2$ (39 μg Zn^{2+}/rat, i.v.), was significantly higher than that in controls (2.37 versus 0.63% of the administered dose), as was the rate of excretion. Urinary and fecal excretion of ^{65}Zn did not differ significantly in the exposed and control animals. The mean amount of ^{65}Zn in the liver of CCl_4-treated rats (16.8%) was significantly different from that in the controls (20.0%), but the distribution in the kidney, plasma, and the wall of the gastrointestinal tract was not significantly different in the two groups. There were no statistically significant differences in the biliary excretion of ^{64}Cu following the injection of $^{64}CuCl_2$ (40 μg Cu^{2+}/rat, i.v.) in the treated and untreated animals, but the urinary and fecal excretion in the treated rats (3.13 and 4.78, resp.) were significantly higher than those in the untreated controls (1.3 and 2.35%, resp.). The ^{64}Cu content in the liver and kidneys in the treated rats (20.5% and 9.67%, resp.) was significantly higher than in the controls (10.8% and 2.5%, resp.). After the administration of $^{203}HgCl_2$ (120 μg Hg^{2+}/rat, i.v.), the mean cumulative ^{203}Hg biliary excretion in the exposed animals (1.94%) was significantly lower than that in the controls (4.1%). The urinary Hg excretion was similar in the two groups, and the fecal excretion was significantly higher in the exposed rats (2.95%) than that in the controls (1.64%). The ^{203}Hg content in the kidneys of the exposed animals (8.24%) was lower than that in controls (9.6%), and that in the gastrointestinal wall in the exposed group (1.67%) was lower than in controls (2.45%). The results suggest that animals with CCl_4-induced liver damage are capable of utilizing alternate pathways for the excretion of exogenous metals.

7004 INDUCTION AND PREVENTION OF GALACTOSAMINE HEPATITIS. (Eng.) Reutter, W.; Hassels, B.; Lesch, R. *In: New Trends in the Therapy of Liver Diseases. Proceedings of the International Symposium on New Trends in the Therapy of Liver Diseases, Tirrenia, June 6-7, 1974.* (New York: Karger): pp. 121-127; 1975.

The effect of (+)-cyanidanol-3 on the development of galactosamine hepatitis was tested in female Wistar rats, and the induction of hepatitis by galactosamine is reviewed. The administration of D-galactosamine (375 mg/kg) to rats pretreated with (+)-cyanidanol-3 (250 mg/kg) resulted in only slight increases in the mean levels of plasma SGOT (49 mU/ml), sorbitol dehydrogenase (8 mU/ml), and glutamate dehydrogenase (11 mU/ml), whereas these levels in rats treated only with D-galactosamine were significantly elevated (731 mU/ml, 598 mU/ml, and 264 mU/ml, resp.). The mean bilirubin concentration in the pretreated rats (0.12 mg/100 ml) was normal, whereas that in the animals treated only with D-galactosamine was 1.06 mg/100 ml. Lower doses of (+)-cyanidanol-3 (10 and 50 mg/kg) also reduced the liver-damaging effects of D-galactosamine, in a dose-dependent manner. The rate of 1-^{14}C-L leucine (100 μCi/kg, i.p.) incorporation in rats that had been previously treated with D-galactosamine (375 mg/kg) was 35% of the control value. When the rats were also pretreated with (+)-cyanidanol-3 (3 x 250 mg/kg/day), the incorporation rate was also decreased, but only to 50% of the control value. This demonstrates that (+)-cyanidanol-3 interacts with the protein metabolism of the liver plasma membrane.

7005 EFFECTS OF HISTAMINE, VASOPRESSIN, AND ANGIOTENSIN II ON HEPATOSPLANCHNIC HEMODYNAMICS, LIVER FUNCTION, AND HEPATIC METABOLISM IN CATS. (Eng.) Krarup, N. (Inst. Physiology, Univ. Aarhus, Aarhus, Denmark). *Acta Physiol. Scand.* 95 (3):311-317; 1975.

The effects of continuous i.v. infusions of histamine (5 μg/kg/min), vasopressin (10 mU/kg/min), or angiotensin II (0.5 μg/kg/min) on hepatosplanchnic hemodynamics in fasting cats were investigated. Hepatic arterial flow was decreased 30% by histamine and increased 30% by vasopressin, but portal venous flow was increased 25% and decreased 40%, resp. Both were not significantly affected by angiotensin. The hepatic arterial conductance was decreased 25% by histamine and angiotensin and not significantly affected by vasopressin. The gastrointestinal conductance was decreased 40% by vasopressin and angiotensin and increased 25% by histamine. The conductance in the intrahepatic low-pressure vessels was not affected by histamine and vasopressin, but it decreased 25% during angiotensin infusion. These hemodynamic effects were not accompanied by changes in liver function or hepatic metabolism, as judged from the splanchnic elimination of ethanol, the hepatic uptake and excretion of indocyanine green, the hepatic oxygen consumption, and lactate and ketone production.

7006 NUTRITIONAL REGULATION OF LIPID METABOLISM IN RATS VII. EFFECT OF OVERNIGHT FASTING ON LIVER LIPIDS OF RATS FED DIFFERENT LEVELS OF ESSENTIAL FATTY ACIDS. (Eng.) Sugano, M.; Imaizumi, K.; Kamo, F. (Lab. Nutrition Chemistry, Kyushu Univ. Sch. Agriculture, Higashi-ku, Fukuoka 812, Japan). *Nutr. Metab.* 19(1/2):65-72; 1975.

The effect of overnight fasting on the concentration and composition of hepatic lipids was investigated in male Wistar rats fed different levels of essential fatty acids (EFA). The animals were fed either a fat-free diet for 17 days or a diet containing 20% corn oil, 5% corn oil, or 20% lard for 14 days. The mean hepatic triglyceride content was significantly increased in fasted animals on the 5% corn oil diet (23.4 mg/g), in comparison with that in fed controls (13.5 mg/g). The mean concentration of hepatic phospholipid was similar among the controls fed the different diets; fasting produced significant increases in phospholipid concentration in all diets (31.2, 30.4, 32.1, and 28.0 mg/g in controls fed the 20% corn oil, 5% corn oil, 20% lard, or fat-free diets, resp.; 39.3, 41.2, 41.4, and 37.4 mg/g in fasted animals fed the respective diets). The fatty acid composition of triglyceride in the animals fed the 5% corn oil or the 20% lard diets was significantly changed by fasting; the percentages of linoleic and arachidonic acids increased significantly, while those of oleic and palmitoleic acids decreased significantly. Palmitic acid also decreased significantly in the fasted rats fed the 20% lard diet. There was a significant decrease in the percentage of oleic acid and a significant increase in that of arachidonic acid in the phosphatidylcholine from the livers of fasted rats. In the hepatic phosphatidylcholine of fat-fed rats, the percentage of linoleic acid was significantly decreased. The results show that the effect of overnight fasting on the concentration and composition of hepatic lipids differs considerably, depending upon the pool size of EFA in the body.

7007 EFFECT OF DIETARY SUCROSE AND FRUCTOSE ON THE METABOLISM AND LIPID FRACTIONS IN LIVER IN THE RAT. (Eng.) Tuovinen, C. G. R.; Bender, A. E. (Dept. Public Health, 62 Beulah Road, Norwood, South Australia 5067). *Nutr. Metab.* 19 (1/2):1-9; 1975.

Experiments were carried out to determine whether the changes in lipid metabolism and hepatic lipid fractions observed previously in rats fed 60-80% sugars in the diet can be effected at lower proportions of dietary carbohydrate and whether these changes persist on feeding the diets for longer periods of time. Male and female Lister rats were fed one of the following diets for 26 weeks: 60% (weight/weight) starch as control (59% of energy content), 20% sucrose (20% of energy content), 40% sucrose (39% of energy content), 60% sucrose (59% of energy content), or 20% fructose (20% of energy content). Forty and 60% sucrose caused an increase in liver weight in male rats only (control 4.5 g/100 g body weight; 40% sucrose 4.7 g/100 g; 60% sucrose 4.9 g/100 g). In both males and females, 40 and 60% sucrose increased the total lipid content of the liver by 132% and 117%, resp., in the males and by 131% and 112%, resp., in the females (the 3 former values were significant at the 95% confidence level, while the latter value was not significant). These increases were caused primarily by increases in triglycerides, which were significantly higher than in controls (186% and 154% of control levels in males fed 60% and 40% sucrose, resp.; 189% and 165% of control levels in females, resp.). Lipogenesis was reduced to 71, 67, and 73% of the control values in male rats fed the 60, 40, and 20% sucrose diets, resp. (significant at 95% confidence level), and to 69, 65, and 78% of the control values in female rats fed the respective diets (significant at 95% confidence level). Glucose oxidation was also significantly reduced in both males (75, 74, and 82% of controls, resp.) and in females (74, 77, and 90%, resp.). The fructose diet produced a significant increase (143%) in the triglyceride content of the liver in male rats only, and produced significant decreases in lipogenesis and glucose oxidation in males (71% and 74% of controls, resp.) and in females (63% and 77% of controls, resp.). Plotting the amount of dietary sucrose versus the percent increase in liver lipid concentration or triglyceride concentration showed that even a low level of dietary sucrose increased liver total lipids and triglycerides after 26 weeks in males and females. The effect of sucrose on lipogenesis and glucose oxidation from ^{14}C-glucose was nearly at its maximum at 20% of the diet, and no difference was seen in the effect of 40 or 60%. The results indicate that the effect of sucrose could mainly be due to the fructose portion. These studies indicate that the increase in triglyceride levels are comparable with those obtained in rats fed 72% sucrose or fructose diets in previous studies.

7008 INFLUENCE OF EXPERIMENTAL DIETARY CONDITIONS ON HEPATIC ENZYMES OF GLUTAMIC ACID METABOLISM IN RATS. (Eng.) Lal, H.; Agarwal, K. N. (Pediatric Hematology Unit, Banaras Hindu Univ., Varanasi 221005, India.) *Nutr. Metab.* 19(1/2): 20-27; 1975.

Some hepatic enzymes associated with glutamic acid metabolism were studied in rats under various experimental dietary conditions. There was a significant reduction in the levels of all hepatic enzymes measured in rats fed a low protein diet (2% casein) for 8 days; the mean levels of glutamine synthetase, glutamine transferase, glutamic pyruvic transaminase, aspartic α-oxoglutarate transaminase, glutaminase I, glutaminase II, and glutamate decarboxylase were 8.3, 16.4, 84.5, 13.4, 89.0, 33.0, and 8.9 U/g, resp., in the experimental animals, whereas the levels in controls fed a diet containing 15% casein were 9.5, 22.7, 105.8, 21.0, 127.3, 43.2, and 16.5 U/g, resp. When rats fed the low protein diet for 8 days were given a normal diet for the following 8 days, the enzyme levels increased, but were not significantly different from controls. In the animals restored to the normal diet, the activities of glutamic pyruvic transaminase (98.8 U/g), aspartic α-oxoglutarate transaminase (17.3 U/g), glutaminase II (39.0 U/g), and glutamate decarboxylase (14.0 U/g) were significantly increased over those observed in animals on the low protein diet, but were still lower than in controls. In another group of animals, starvation for 7 days resulted in significant decreases in all hepatic enzymes. In animals fed for 8 days on a carbohydrate-free, protein-rich diet containing 90% casein and 5% fat, the levels of all hepatic enzymes were increased; the increases were significant only for glutamine synthetase (12.1 U/g), glutamine transferase (25.2 U/g), glutamic pyruvic transaminase (124.5 U/g), glutaminase I (162.5 U/g), and glutamate decarboxylase (26.2 U/g). In animals fed for 8 days on a low protein diet made isonitrogenous by the addition of urea, the levels of hepatic glutamic pyruvic transaminase, glutaminase I, and glutamate decarboxylase were significantly reduced. When the low protein diet was made isonitrogenous by the addition of ammonium oxalate, the activities of glutamine synthetase, glutamine transferase, pyruvic transaminase, glutaminase I, and glutamate decarboxylase were significantly lowered. When glutamic acid was used as supplementary nitrogen, the levels of glutamine synthetase, glutamine transferase, glutamic pyruvic transaminase, and glutamate decarboxylase were significantly increased. Dietary protein deficiency, due to a decrease in the total pool of free amino acids, may lower the substrate concentration for hepatic enzymes.

7009 EFFECTS OF LOW AND HIGH PROTEIN DIETS ON THE INDUCTION OF MICROSOMAL DRUG-METABOLIZING ENZYMES IN RAT LIVER. (Eng.) Sachan, D. S. (Dept. Pharmacology, Meharry Medical Coll., Nashville, TN 37208). *J. Nutr.* 105(12):1631-1639; 1975.

The effects of low- and high-protein diets on the activity of hepatic microsomal drug-metabolizing enzymes catalyzing oxidation, reduction, and conjugation were investigated in Sprague-Dawley rats. Male and female rats were fed, *ad libitum*, diets containing 3.5% (low protein, LP), 26% (normal protein, NP), and 42% (high protein, HP) casein for 33 days. Five animals from each dietary group were injected i.p. with 10 mg of phenobarbital (PB)/kg on days 30-33. The 10,000 X *g* supernatant and microsomes were prepared from the perfused livers. Both LP and HP diets caused a significant decrease in the activity of biphenyl-4-hydroxylase, an increase in the activity of p-nitrobenzoate reductase, and no changes in the activities of 4-methylumbelliferone glucuronyltransferase or cytochrome P-450. The low doses of PB caused significant induction of cytochrome P-450 ($p<0.10$), biphenyl-4-hydroxylase, and n-nitrobenzoate reductase (except in LP and NP females). The NP and HP males had consistently higher activities of these enzymes than females; however, this sex difference in the first two enzymes was abolished by feeding of the LP diet. It was also found that dietary-protein deficiency retards growth, but excess dietary protein does not provide any significant advantage in terms of weight gain.

7010 TOXIC EFFECTS OF RICIN: STUDIES ON THE PATHOGENESIS OF LIVER LESIONS. (Eng.) Derenzini, M.; Bonetti, E.; Marinozzi, V.; Stirpe, F. (Inst. di Patologia generale, Universita di Bologna, Roma, Italy). *Virchows Arch.* [*Zellpathol.*] 20(1):15-28; 1976.

Protein synthesis and the ultrastructure of the liver and spleen of Wistar rats that received an i.p. or s.c. injection of ricin (1 or 10 μg/100 g) were studied in an effort to clarify the pathogenesis of ricin-induced liver lesions. Although there was no significant change in the mean level of hepatic protein synthesis at 40 hr after the injection of 1 μg of ricin, protein synthesis was reduced to 86% of the control level 22 hr following the injection of 10 μg/100 g of ricin. The rate of protein synthesis in the spleen was reduced to 75% of the control level only 6 hr after this injection, to 25% of the control level after 12 hr, and to 12% of the control level after 22 hr. The rats fed the 1- and 10-μg/100 g doses died from severe focal liver necrosis within 24 and 72 hr after poisoning, resp. The first ultrastructural lesions occurred in the sinusoidal cells, particularly the Kupffer cells. These lesions included vesiculation, fragmentation and degranulation of the rough endoplasmic reticulum, and swelling of the cytoplasm. The lesions in the hepatocytes began only after sinusoidal cells were severely damaged or even necrotic. The 1 μg/100 g dose of ricin produced no detectable light microscopic changes in the spleen at 48 hr after poisoning. After the 10 μg/100 g dose, total necrosis of the reticuloendothelial cells of the red pulp of the spleen was observed. Lymphoid follicles were well preserved, although nuclear debris, together with pyknotic nuclei, occurred in the central portion. Other nuclei appeared vesiculated, and their chromatin was marginated. In animals poisoned with 1 μg/100 g of ricin 24 hr following splenectomy, the sinusoidal cell necrosis was much more extensive. It is postulated that hepatocyte necrosis may be a consequence of the disappearance of sinusoidal cells. This might explain why protein synthesis was relatively unaffected in the liver. Since ricin exerted its toxic effect on the sinusoidal cells, the inhibition was not detectable, these cells being "diluted" by the mass of parenchymal cells.

7011 STUDIES ON IRON TURNOVER IN RATS WITH PORTACAVAL ANASTOMOSIS. (Ger.) Becker, K. (No affiliation given). *Z. Gastroenterol.* 14(Suppl.): 238; 1976.

The effect of portacaval shunt on hepatic iron metabolism is reported. Male Wistar rats received labeled iodine, i.v., in albumin, 1 μCi of ^{59}Fe (II) sulfate by gavage, and ^{51}Cr chromate by injection. Group 1 consisted of rats with portacaval end-to-side anastomosis, group 2 comprised sham-operated rats in pair-feeding studies, and group 3 was the control group on standard diet. The iron content was 95.6 μg/g of body weight in group 1, 47.6 μg/g in group 2, and 73.8 μg/g in group 3. The iron resorption rate was equivalent in all three groups. The RBC ^{51}Cr half-life was 6.6 days in group 1, 13.6 days in group 2, and 10.6 days in group 3; the differences were not significant. The increased iron content of liver with portacaval shunt is neither the result of increased intestinal absorption nor increased hemolysis, but is rather a sequel of the concentration phenomena observed during prominent liver atrophy.

7012 EFFECT OF PORTACAVAL SHUNT ON THE DISPOSITION OF DRUGS WITH AND WITHOUT FIRST-PASS EFFECT. (Eng.) Gugler, R.; Lain, P.; Azarnoff, D. L. (Dept. Medicine, Univ. Bonn, Bonn, W. Germany). *J. Pharmacol. Exp. Ther.* 195(3):416-423; 1975.

The pharmacokinetic parameters of lidocaine, antipyrine, and salicylamide were studied in dogs before and after construction of a portacaval shunt. The drugs were administered p.o. and i.v. on separate occasions, and blood samples were analyzed by chromatography or fluorometry. The systemic availability of lidocaine (10 mg/kg) increased from 14.8 ± 2.8% to 81.3 ± 5.2%, while its elimination rate decreased after portacaval shunting from a $T_{1/2}$ of 74.4 ± 2.3 min to 88.4 ± 3.0 min. The systemic availability of antipyrine (20 mg/kg) was not altered significantly by the surgical procedure (93.0 ± 7.1% before and 102.2 ± 7.1% after). Salicylamide (30 mg/kg) was 21.8 ± 7.8% available in the intact animal; after shunting, it was 57.5 ± 2.5% available. Of the 78% first-pass extraction of salicylamide, 36% was due to hepatic extraction and 42% to intestinal wall extraction. The shunt also reduced the plasma clearance of lidocaine and antipyrine, but not of salicylamide. The apparent distribution volume was decreased only with salicylamide. It is concluded that surgical construction of a portacaval shunt in dogs is a good model to evaluate the first-pass effect. Physicians should lower the dosage of drugs with a first-pass effect in patients with a surgical portacaval shunt or endogenous portal systemic shunts, as seen in liver cirrhosis.

7013 THE EFFECT OF PORTACAVAL TRANSPOSITION ON HEPATIC CHOLESTEROL-7α-HYDROXYLASE ACTIVITY IN THE RAT. (Eng.) Boyd, G. S.; Lawson, M. E. (Dept. Biochemistry, Univ. Edinburgh Medical Sch., Teviot Place, Edinburgh, EH8 9AG, Scotland). *FEBS Lett.* 64(2):435-439; 1976.

The effects of portacaval anastomosis on liver microsomal cholesterol-7α-hydroxylase (ChH) activity and cytochrome P-450 concentration in rat liver microsomes were investigated in 54 male Wistar rats. The rats were killed at fixed periods 10-80 days after the anastomosis, in which an end-to-side technique was used. The postoperative mortality was very low (10%). The liver microsomal ChH activity was significantly elevated in all animals 80 days later. However, the increase was apparent a few days after the operation. The microsomal cytochrome P-450 content was significantly decreased. Animals subjected to anastomosis and subsequently fed a stock diet containing 4% cholestyramine resin, a bile salt sequestering agent, for 5 days, had even higher ChH activities. The results suggest that one of the factors influencing the activity of liver microsomal ChH may be the concentration of bile salts reaching the liver from the blood plasma. Portacaval anastomosis in the rat tended to produce a small decrease in the plasma cholesterol concentration.

7014 ORTHOTOPIC LIVER TRANSPLANTATION AFTER PRESERVATION WITHOUT PERFUSION FOR UP TO SIX HOURS: A CONTROLLED TRIAL EVALUATING DIFFERENT PRESERVATION FLUIDS IN DOGS AND PIGS. (Eng.) Schalm, S. W.; Terpstra, J. L.; Popescu, D. T.; Krom, R. A. F.; Jerusalem, C. (Mayo Clinic, Rochester, MN 55901). *Surgery* 78(5):637-643; 1975.

To investigate the effect of the composition of the preservation fluid on the immediately postoperative transplant function and on subsequent long-term survival, orthotopic liver transplantations were performed in 13 dogs and 12 pigs. Donor and recipient pairs always were litter mates, the dogs being identical according to lymphocyte typing. The ischemic periods were 1, 3, and 6 hr. Four different preservation fluids were used, with marked differences in ionic composition (extracellular versus intracellular) pH, and osmolarity. Within each ischemic period group, the sequence of experiments was randomized with respect to the different preservation fluids. Twenty-four animals survived the transplantation procedure. No differences were found between the preservation fluid groups. Postoperative function of all livers preserved for 6 hr was comparable to those with 1-hr ischemia. Three dogs and four pigs (6 of 7 with livers preserved for 3 or 6 hr) are still alive more than 1 yr after transplantation. The results indicate that consistently excellent liver function leading to long-term survival in 36% of cases can be obtained after liver transplantation with preservation up to 6 hr; for this result, the composition of the preservation fluid is of minor importance.

7015 A NEW MODEL OF EXPERIMENTAL TOXIC HEPATITIS. ACUTE DEGENERATIVE HEPATITIS INDUCED BY FROG VIRUS 3 (FV_3) IN THE MOUSE. (Ger.) Elharrar, M.; Bingen, A.; Drillien, R.; Gendrault, J. L.; Steffan, A.-M.; Kirn, A. (Laboratoire de Virologie, Faculte de Medecine, Universite Louis Pasteur, F-67 000 Strasbourg, France). *Arzneim. Forsch.* 25(10): 1586-1591; 1975.

A new model for hepatocyte necrosis from purely toxic interference in macromolecular synthesis by frog virus, FV_3 is reported. The virus was isolated from renal carcinoma in *Rana pipiens*. FV_3 inoculation, i.p. or i.v., elicits an acute hepatitis in mice, mainly associated with inhibition of RNA synthesis, which is fatal in 24 hr; p.o. or s.c. administration is without effect, even after a lethal dose of 5×10^7 virions. The dose-response curve is "all-or-nothing," and the effect, whose lesions are most prominent in liver, is nonspecific, including modification of chromatin, pyknosis, and nucleolar changes. Cytoplasmic dystrophy and vacuolization, especially of the endoplasmic reticulum, occurs later. Accordingly, nuclear enzymes are chiefly affected and DNA- and RNA-polymerase activity is reduced. Since intracellular virion proliferation does not occur, effective treatment must be directed against the effect of virus protein on host cell metabolism. Mice were given silymarine hemisuccinate (SHS, 30 mg/kg, i.p.), which is equivalent to 208.3 mg silymarine, 20 hr before an LD_{80} injection of FV_3. The mortality was 0%. If SHS was administered 1 hr before the virus, mortality was 20%; administration 3 and 6 hr after virus inoculation resulted in a mortality of 80% in both cases. Against doses double the LD_{100}, single SHS injections led to 75% mortality, whether given 20 or 2 hr before the virus. Two SHS injections (300 mg/kg) 20 or 2 hr before allowed only 35% mortality. The FV_3 LD_{50} for mice is 9 x 10^6 virions; after SHS pretreatment, it rises to 2.5 x 10^7, or 16 million more FV_3 particles. SHS protection is conferred 2 hr after the last SHS injection and increases the survival time. The mean survival in control mice was 24.4 hr and for SHS mice, it was 33-45 hr. The mechanism of SHS prophylaxis of RNA synthesis is not known.

7016 VACCINE AGAINST HUMAN HEPATITIS B. (Eng.) Buynak, E. B.; Roehm, R. R.; Tytell, A. A.; Bertland, A. U., II; Lampson, G. P.; Hilleman, M. R. (Merck Inst. Therapeutic Res., West Point, PA 19486). *JAMA* 235(26):2832-2834; 1976.

A highly purified vaccine was prepared, using hepatitis B surface antigen (HBsAg), and its protective efficacy and safety were evaluated in chimpanzees, guinea pigs, grivet monkeys, and marmosets. The absence of live hepatitis A virus in the vaccine was established by tests in the marmosets. All of 10 guinea pigs, 5 of 6 grivet monkeys, and 5 of 6 chimpanzees given three doses of the vaccine (20 μg, s.c.) developed antibody to HBsAg (anti-HBsAg), the titers being 75, 22.6, and 36.8 in the guinea pigs, monkeys, and chimpanzees, resp. Six chimpanzees given the same dose of vaccine and five unvaccinated control animals were all challenged with approximately 1,000 chimpanzee-infectious doses of live hepatitis B virus, i.v. The control animals, all initially devoid of anti-HBsAg, had hepatitis B infection, as indicated by tests for HBsAg, transaminase elevation, and antibody to hepatitis B core antigen. Five vaccinated animals had anti-HBsAg by the time of challenge. None of the six animals had hepatitis B following challenge. The one animal that did not develop anti-HBsAg on vaccination did develop this antibody following the challenge. The results suggest an eventual role of highly purified viral antigen vaccine for the control of hepatitis B.

7017 CARCINOGEN-INDUCED DNA REPAIR IN PRIMARY RAT LIVER CELL CULTURES; A POSSIBLE SCREEN FOR CHEMICAL CARCINOGENS. (Eng.) Williams, G. M. (Naylor Dana Inst. Disease Prevention, Valhalla, NY 10595). *Cancer Lett.* 1(4):231-235; 1976.

The first determination of damaging action of carcinogens on DNA of primary liver cultures, as measured by unscheduled DNA synthesis representing DNA repair, is reported. Primary Fischer rat liver cell cultures were exposed to the direct acting carcinogen, methyl methanesulfonate (2 x 10^{-3}-6 x 10^{-3} M), and to procarcinogens requiring metabolic activation, aflatoxin B_1 and B_2 (1 x 10^{-7}-1 x 10^{-3} M and 1 x 10^{-5} M, resp.). Methyl methanesulfonate induced light nuclear labeling. The mean counts increased slightly with dose (10-14 grains/nucleus), but for the narrow dose range, the means were not significantly different. These doses produced DNA damage, and the DNA-binding agent, chloroquine (3 x 10^{-4} M) blocked the repair of this damage (0 grains/nucleus). Aflatoxin B_1 induced even greater unscheduled DNA synthesis (4-39 grains/nucleus), which increased as the dose increased. The weakly carcinogenic aflatoxin B_2 induced less unscheduled synthesis (7 grains/nucleus) than aflatoxin B_1, confirming the previous finding that the level of repair correlates with carcinogenic potential. Treatment with all carcinogens resulted in equal unscheduled DNA synthesis in both nuclei of binucleate cells, with a few exceptions in which there was up to a 30% difference. The results suggest that this system may be adapted for screening suspected chemical procarcinogens and for investigating the relation between metabolic activation of procarcinogens and DNA damage, DNA repair, and carcinogenicity.

7018 FACTORS INFLUENCING THE ESTABLISHMENT OF THE NORMAL VALUES OF THE RESPIRATORY ACTIVITIES OF HUMAN LIVER MITOCHONDRIA. (Eng.) Toader, C.; Acalovschi, I.; Toader, I.; Manta, I.; Hodarnau, A.; Benga, G. (Medical Pharmaceutical Inst., 6, Pasteur St., Cluj-Napoca, Rumania). *Enzyme* 21(3): 232-242; 1976.

7019 RECENT STUDIES ON CYTOCHROME P-450-LINKED FUNCTIONS IN ISOLATED RAT LIVER CELLS. (Eng.) Orrenius, S.; Moldeus, P.; Vadi, H.; Grundin, R. (Karolinska Institutet, S-10401, Stockholm, Sweden). *Forensic Sci.* 6(1/2):67-72; 1975.

7020 NUCLEOLAR CHANGES IN LIVER BEFORE THE ONSET OF DEOXYRIBONUCLEIC ACID REPLICATION. (Eng.) Bailey, R. P.; Rudert, W. A.; Short, J.; Lieberman, I. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *J. Biol. Chem.* 250(11):4305-4309; 1975.

7021 ON THE OBLIGATORY ROLE OF THE HYPOPHYSIS IN SEXUAL DIFFERENTIATION OF HEPATIC METABOLISM IN RATS. (Eng.) Gustafsson, J. A.; Stenberg, A. (Dept. Chemistry, Karolinska Institutet, S-104 01, Stockholm 60, Sweden). *Proc. Natl. Acad. Sci.* 73(5):1462-1465; 1976.

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7062 METABOLISM OF 1α-HYDROXYVITAMIN D_3 TO 1α-,25-DIHYDROXYVITAMIN D_3 IN PERFUSED RAT LIVER. (Eng.) Fukushima, M.; Suzuki, Y.; Tohira, Y.; Matsunaga, I.; Ochi, K.; Nagano, H.; Nishii, Y.; Suda, T. (Research Lab. Chugai Pharmaceutical Co., Ltd., Takada, Toshima-ku, Japan). *Biochem. Biophys. Res. Commun.* 66(2):632-638; 1975.

See also, 6928, 6975, 6976, 7063, 7093, 7151, 7503, 7666.

SECRETION AND METABOLISM

Intestine

7063 THE ROLE OF THE COLON IN UREA METABOLISM IN MAN. (Eng.) Gibson, J. A.; Park, N. J.; Sladen, G. E.; Dawson, A. M. (St. Bartholomew's Hosp., London E.C.1, England). *Clin. Sci. Mol. Med.* 50(1):51-59; 1976.

To study the role of the colon in urea hydrolysis and ammonia production, urea excretion in 29 ileostomy effluent specimens was determined as an indirect measure of the amount of urea entering the colonic lumen. Urea turnover was determined in six controls and six patients with nonfunctioning colons. The ileostomy urea concentration was 0.58-9.17 mM, and the determination of the blood urea concentration in 26 cases revealed that the mean ratio of ileostomy urea to blood urea was 0.715. In the normal subjects, the mean breakdown of urea in the gut (determined by the plasma disappearance of i.v.-administered ^{14}C-urea) increased from 4.3 mmol/hr on a low protein (40 g) diet to 7.6 mmol/hr on a high protein (100 g) diet ($p<0.02$). This increase in dietary protein intake also resulted in an increase in urea production from a mean value of 14.2 mmol/hr to 28.2 mmol/hr. When urea metabolism was expressed as a percentage of urea synthesis, the percentage was unaffected by variations in dietary protein. When this percentage was compared in the normal subjects and the patients with nonfunctioning colons, the removal of the colon resulted in a fall from a mean value of 28.3% in controls to 19.7% in patients with nonfunctioning colons ($p<0.025$). The results suggest that the colonic lumen is not the only site of intestinal ureolysis and that significant quantities of urea must be broken down either at a juxtamucosal site or in the ileum.

7064 ON THE HYDROPHOBIC PART OF AMINOPEPTIDASE AND MALTASES WHICH BIND THE ENZYME TO THE INTESTINAL BRUSH BORDER MEMBRANE. (Eng.) Maroux, S.; Louvard, D. (Centre de Biochimie et de Biologie Moleculaire du Centre National de la Recherche Scientifique, 31, Chemin Joseph-Aiguier, 13274 Marseille Cedex 2, France). *Biochim. Biophys. Acta* 419(2):189-195; 1976.

Evidence is presented to show that the hydrophobic parts of aminopeptidase and the maltases $M_2 + M_3$ in porcine intestinal brush border membranes are relatively short polypeptide chains rich in apolar residues and containing no disulfide bridges. The detergent and hydrophobic forms of the enzymes were purified. These hydrolases were composed of a hydrophilic, sugar-containing, and enzymatically active part and a smaller hydrophobic part presumably binding the catalytic part to the lipid matrix of the membrane. Hydrophobic parts detached by trypsin from the detergent forms were shown to have molecular weights of 8,000 to 10,000. The aminopeptidase and maltases contained no disulfide bridges but did contain a large number of hydrophobic residues typical of intrinsic membrane proteins. However, their overall amino acid composition was different. The hydrophobic parts appeared to be N-terminal in the detergent forms of the enzymes. It is concluded that the three hydrolases are amphipathic molecules.

7065 CIRCADIAN RHYTHMS IN DIGESTIVE ENZYMES IN THE SMALL INTESTINE OF RATS. I. PATTERNS OF THE RHYTHMS IN VARIOUS REGIONS OF THE SMALL INTESTINE. (Eng.) Saito, M.; Murakami, E.; Nishida, T.; Fujisawa, Y.; Suda, M. (Sch. Medicine, Ehime Univ., Shigenobu, Ehime 791-02, Japan). *J. Biochem. (Tokyo)* 78(3):475-480; 1975.

Circadian variations in the activities of maltase, sucrase, trehalase, leucine aminopeptidase, and alkaline phosphatase were studied in the jejunum and ileum of male Wistar rats. The effect of altered feeding schedules on the circadian rhythms was also studied. The activities of these enzymes were higher in the jejunum than in the ileum, and in the distal ileum no sucrase, trehalase, or alkaline phosphatase activity was detected. When the rats were fed *ad libitum,* all enzyme activities exhibited clear circadian fluctuations in the small intestine, with the highest activities at 0000-0400 hr and lowest at 1200 hr. The amplitudes of the rhythms of dissacharidases and alkaline phosphatase were highest in the proximal jejunum; the rhythmic variation was less marked in the distal jejunum and proximal ileum and was not detected in the distal ileum. Leucine aminopeptidase showed a circadian variation in the ileum, with the same amplitude as in the jejunum. When the rats were fed during the day only (from 0900 hr to 1500 hr) for 2 weeks, the circadian variations shifted about half a day, but the amplitude of the rhythm did not change. The results suggest that the circadian rhythms in the digestive and absorptive functions of the small intestine are closely related to the rhythm of food intake.

7066 EFFECT OF DIET ON DIGESTIVE AND ABSORPTIVE FUNCTIONS OF RAT SMALL INTESTINE. (Eng.) Saito, M.; Suda, M. (Dept. Biochemistry, Sch. Medicine, Ehime Univ., Shigenobu, Ehime 791-02, Japan). *J. Nutr. Sci. Vitaminol. (Tokyo)* 21(4):313-315; 1975.

The effect of diet on the digestive and absorption rates of L-histidine and D-galactose was investigated in the small intestine of male Wistar rats. Rats were fed either a diet with high starch (71%) and low casein (5%) contents (I) or a diet with low starch (15%) and high casein (76%) contents (II) *ad libitum* for 5 days. Maltase, sucrase, and leucine aminopeptidase activities were measured in homogenates of the intestinal mucosa. Diet II decreased the activities of maltase ($p<0.01$) and sucrase ($p<0.02$) and increased that of leucine aminopeptidase ($p<0.005$). The corresponding values (in µmol/min/mg of protein) in diets I and II for maltase were 0.389 and 0.289; for sucrase, 0.043 and 0.022; and for leucine aminopeptidase, 0.028 and 0.049. The absorption rate of L-histidine was higher in rats fed diet II (0.477 µmol/min/mg intestine; $p<0.01$) than in rats fed diet I (0.284 µmol/min/mg). The absorption rate of D-galactose was not significantly different in rats on either diet. Thus, the absorption rate of galactose is not influenced by diet, in contrast to disaccharidase.

7067 EFFECT OF ALCOHOL INGESTION ON THE EPITHELIAL CELL POPULATION IN RAT SMALL INTESTINE (Eng.) Zucoloto, S.; Rossi, M. A. (Dept. Pathology, Medical Sch. Ribeirao Preto, Caixa Postal 301, Ribeirao Preto, S.P., Brazil). *Experientia* 32(5):614-616; 1976.

The effect of prolonged alcohol ingestion on the small intestinal cell population in otherwise well-nourished rats was investigated. Male Wistar rats were allowed to drink only a 32% (weight/volume) ethyl alcohol solution in 25% sucrose in tap water for 12 weeks. Controls were not given alcohol. The percentage of cells in division during a given time interval was determined by the colchicine technique. Alcohol-fed rats gained 23%-28% less weight than the controls. Clinical signs of inebriation were commonly seen among these animals. They consumed 27% of their calories as alcohol, and the calories consumed daily were 10% less than that of the control group. The jejunal and ileal mucosae from the alcoholic rats were thinner than those of the controls, and the intestinal crypts had a decreased epithelial cell count, both in the jejunum ($p<0.1$) and in the ileum ($p<0.05$). Mitosis (prophase plus metaphase) per 100 crypt cells was also significantly decreased in the jejunum ($p<0.005$) and ileum ($p<0.005$). The results support the view that alcohol is directly toxic to the small intestine.

7068 EMBRYONIC CHICK INTESTINE IN ORGAN CULTURE: STIMULATION OF CALCIUM TRANSPORT BY EXOGENOUS VITAMIN D-INDUCED CALCIUM-BINDING PROTEIN. (Eng.) Corradino, R. A.; Fullmer, C. S.; Wasserman, R. H. (Dept. Physical Biology, New York State Coll. Veterinary Medicine, Cornell Univ., Ithaca, NY 14853). *Arch. Biochem. Biophys.* 174(2):738-743; 1976.

The stimulation of Ca transport by exogenous vitamin D-induced Ca-binding protein (CaBP) was investigated in embryonic chick intestine in organ culture. The apparatus used allowed the continuous rotation of everted embryonic duodena at the surface of the culture medium, assuring adequate gaseous exchange and nutrient uptake. After culture, CaBP and ^{45}Ca uptake and transport were measured. When vitamin D$_3$ (26 µM) was added to the medium, CaBP was induced in the duodena, tissue uptake of ^{45}Ca was increased 2.8 times, and transmucosal transport was increased 9.3 times over control values. When highly purified chick intestinal CaBP (2.86 µM) was added, tissue uptake of ^{45}Ca was 1.7 times control and transmucosal transport was increased nearly fivefold. A roller-tube culture technique verified the specificity of stimulation of Ca transport in embryonic chick duodena. Bovine intestinal Ca-binding protein and calsequestrin from rabbit sarcoplasmic reticulum (2.86 mM each) bound Ca with high affinity. Purified chick CaBP again stimulated both tissue uptake and transmucosal transport of ^{45}Ca. A potent metabolite of vitamin D_3, 1,25-dihydroxycholecalciferol (6.5 x 10^{-10} M), induced CaBP synthesis and stimulated Ca transport. It is concluded that the vitamin D-induced CaBP is involved in intestinal Ca transport and may be a Ca-transport protein.

7069 DIAMINE OXYDASE IN RABBIT SMALL INTESTINE: SEPARATION FROM A SOLUBLE MONOAMINE OXIDASE, PROPERTIES AND PATHOPHYSIOLOGICAL SIGNIFICANCE IN INTESTINAL ISCHEMIA. (Eng.) Kusche, J.; Richter, H.; Schmidt, J.; Hesterberg, R.; Friedrich, A.; Lorenz, W. (Chirurgischen Klinik der Universitat, D-3550 Marburg a.d. Lahn, Robert-Koch-Strasse 8, W. Germany). *Agents Actions* 5(5):431-439; 1975.

Because diamine oxidase activity is limited to the gut in rabbits, they were used to study the physiological and pathophysiological function of this enzyme in the gastrointestinal tract. The enzyme was purified 100-fold by gel filtration, separated from soluble monoamine oxidase, and the properties of the two enzymes were determined. Diamine oxidase deaminated putrescine (K_m=1.3 x 10^{-4} M; pH optimum 6.4-6.9) and histamine (K_m=8 x 10^{-5} M; pH optimum 7.5), but not serotonin, and was inhibited by aminoguanidine, but not by pargyline. Soluble monoamine oxidase from rabbit small intestine catabolized serotonin (K_m=1.8 x 10^{-4} M; pH optimum 8.8), but not putrescine and histamine, and was inhibited by pargyline, but not by aminoguanidine. Based on these properties it was postulated that *in vitro* intestinal diamine oxidase could inactivate the vasoactive biogenic amine histamine *in vivo*. The small intestine of rabbits was damaged by experimentally inducing total intestinal ischemia. Treatment with aminoguanidine and ischemia killed the animals three times faster than ischemia alone, which supports the hypothesis that intestinal diamine oxidase plays a protective role against histamine.

7070 DISACCHARIDASES OF RAT INTESTINAL MUCOSA UNDER COMBINED CYTOSTATIC TREATMENT WITH VINCRISTINE SULFATE AND IFOSFAMIDE. (Ger.) Hartwich, G.; Domschke, W.; Matzkies, F. (Med. Klinik mit Poliklinik, Univ. Erlangen-Nurnberg, Erlangen, W. Germany). *Arzneim. Forsch.* 26(3):350-352; 1976.

The combined effect of vincristine sulfate (VS) and ifosfamide [IF, 3-(2-chloroethyl)-2-(2-chloroethylamino)-tetrahydro-2H-1,3,2-oxazaphosphorine-2-oxide] on intestinal disaccharidases was studied. SPF Wistar rats received either single doses of 0.1 mg/kg VS and 100 mg/kg IF, i.p., at 12-hr intervals (test A) or single doses of 0.1 mg/kg VS and double doses of 100 mg/kg IF, i.p., also at 12-hr intervals (test B). The duodenal and jejunal mucosa 13 cm distal to the pylorus was harvested and saccharase (SH), lactase (LT), maltase (MT), and cellobiase (CB) levels determined. Macroscopically, the animals had reduced vitality and food intake within 48 hr. The gut was inflamed and "stuck together" at 36 and 48 hr. Histologically, there was cloudy swelling, and nuclear caryorrhexis or pyknosis of isolated crypt cells, with round cell clustering interstitially. The villi were slightly flattened on days 2-4 but there was no other modification in the villi or brush border. The gut disaccharidases were significantly reduced ($p < 0.01$) after test A. SH was lowest in duodenum at 36 hr and jejunum at 48 hr. MT was lowest in both gut regions at 60 hr. After increasing in the next 48 hr, the levels fell again significantly, but not to the original depression. Recovery began after 7 days. LT and CB were less affected, but they followed the SH-MT pattern and significantly ($p<0.01$). Test B produced the same effect but the decline was more pronounced. The lowest SH and MT levels were reached after 60 hr, the subsequent increase was lower than that for test A, and the second depression at 132 hr was deeper. LT and CB activities were already decreased after 24 hr ($p<0.01$) and were scarcely measurable thereafter. VS or IF given alone reduces intestinal disaccharidase activities in the rat. However, combined administration of both drugs results in a more drastic decrease in enzyme activities. The possibility is suggested that maldigestion of disaccharides in man may occur due to polychemotherapy.

7071 ENZYMES OF ORNITHINE METABOLISM IN ADULT AND DEVELOPING RAT INTESTINE. (Eng.) Herzfeld, A.; Raper, S. M. (Harvard Medical Sch., Boston, MA 02215). *Biochim. Biophys. Acta* 428(3):600-610; 1976.

7072 STUDIES ON THE COMPOSITION OF PHOSPHOLIPIDS IN RAT SMALL INTESTINAL SMOOTH MUSCLE. (Eng.) Yamada, K.; Imura, K.; Taniguchi, M.; Sakagami, T. (Sapporo Medical Coll., South 1, West 17, Sapporo, Hokkaido 060, Japan). *J. Biochem.* 79(4): 809-817; 1976.

7073 GLUCURONIDATION OF PARACETAMOL, MORPHINE AND 1-NAPHTHOL IN THE RAT INTESTINAL LOOP. (Eng.) Josting, D.; Winne, D.; Bock, K. W. (Inst. fur Toxikologie and Institut fur Pharmakologie, 74 Tubingen, W. Germany). *Biochem. Pharmacol.* 25(5): 613-616; 1976.

See also, 6912, 6913, 6916, 6919, 6939.

7074 SELECTIVE VAGOTOMY OF THE CANINE OESOPHAGUS--A MODEL FOR THE TREATMENT OF HIATAL HERNIA.

(Eng.) Edwards, M. H. (Welsh Natl. Sch. Medicine, Univ. Dept. Surgery, Heath Park, Cardiff CF4 4XN, Wales). *Thorax* 31(2):185-189; 1976.

The effects of progressive freeing of the vagus nerve from the esophagus on the development of hiatal hernias as resulting from stimulation of the cervical vagus were investigated in adult mongrel dogs. Vagal stimulation resulted in tetanic contraction of the thoracic esophagus with displacement of the esophagogastric junction into the chest, producing a hiatal hernia. The response was unaffected by hyoscine and abolished by D-tubocurarine, suggesting that only striated muscle was involved. Complete intrathoracic freeing of the vagus from the esophagus resulted in a loss of the displacement response. This loss was observed when either the right or the left vagus had been freed (right 80%, left 97%). After stimulation of the opposite vagus following complete freeing of the ipsilateral vagus, there was a mean loss of 24%, suggesting that unilateral freeing interferes with the neuromuscular connections of the opposite side. Stimulation of both vagi when one was completely freed produced only a 40% displacement loss, indicating that a maximum loss would probably be achieved by freeing both vagi. Progressive freeing in five stages from the hiatus to the first rib resulted in progressive loss of contraction of the esophagus upon stimulation. No significant differences in resting pressures in the esophagus were recorded. In three of the test animals, freeing of the vagi from the esophagus did not affect the lowered heart rate produced by vagal stimulation, but in another three the fall in heart rate was abolished. The bundles of vagi passing through the hiatus appeared grossly normal after freeing in all test animals. It is suggested that a selective esophageal vagotomy above the lung hilum might prove an effective adjunct to orthodox hiatal hernia repair in man.

7075 VEGETATIVE INNERVATION OF THE ESOPHAGUS. II. INTRAGANGLIONIC LAMINAR ENDINGS.

(Eng.) Rodrigo, J.; Hernandez, C. J.; Vidal, M. A.; Pedrosa, J. A. (Instituto Cajal, CSIC, C/Valazquez 144, Madrid 6, Spain). *Acta Anat. (Basel)* 92(1):79-100; 1975.

The morphology of the terminal intraganglionic endings of the vagus nerve in the esophagus was studied in the cat and rhesus monkey by osmium tetrachloride-zinc iodide staining. No morphological differences between the two species were noted. Two types of fiber were found, distinguishable by the different appearance of their terminal portions, the specific end structures that they form around the neuronal bodies, and the different types of apparatus to which they give rise. Some of the fibers form complex terminal and other laminar processes, and others form simpler types of apparatus consisting of fibers with varicose thickenings ending in club- or budlike formations. Details of the morphology are described. The quantitative distribution of the intraganglionic laminar endings in different regions of the esophagus was studied in three cats. The number of ganglia in each portion of the esophagus remained essentially constant in all three cats, but the middle portion contained fewer ganglia (average, 166) than did the upper or lower portions (average, 219-221). The mean percentage of ganglia with intraganglionic laminar endings was 81.5 for the upper portion, 52.7 for the middle portion, and 77.0 for the lower portion. A hypothesis proposing an afferent function is offered, but confirmation must await further investigation.

7076 A MECHANISM FOR THE INDUCTION OF IMMUNOLOGICAL TOLERANCE BY ANTIGEN FEEDING: ANTIGEN-ANTIBODY COMPLEXES.

(Eng.) Andre, C.; Heremans, J. F.; Vaerman, J. P.; Cambiaso, C. L. (Unite de Recherche de Physio-Pathologie Digestive--INSERM U45, Hopital Edouard Herriot, Lyon, France). *J. Exp. Med.* 142(6):1509-1519; 1975.

A splenic immune response with immunoglobulin A (IgA) as the dominant antibody can be induced in mice with a short intragastric immunization course with foreign RBC; this response is followed by a prolonged period of hyporesponsiveness to similarly administered antigen. In the present study, this hyporesponsiveness was found to be also manifested towards antigen given i.p., and that one is dealing with tolerance, not with failure to absorb antigen from the gut. In contrast, mice primed parenterally and then challenged intragastrically, behaved as if they never had any previous contact with the antigen, with a primary-type splenic response of predominant IgA character. This agrees with the previously published conclusion that splenic responses to enterically absorbed antigen reflect colonization of the spleen by cells sensitized locally in the gut wall, a site not readily primed by the parenteral route. Serum from intragastrically immunized mice contained a very active tolerogen. *In vivo*, it was capable of conferring tolerance to nonimmune recipient mice. *In vitro*, it paralyzed the activity of antibody-producing cells. Inhibitory sera had weak antibody activity, restricted to the IgA class, and contained immune complexes reacting with rheumatoid factor but not with the C1q component of rabbit complement. Elimination of these complexes by means of insolubilized rheumatoid factor abolished the tolerogenic effect. The enterically induced tolerogen seems to consist of immune complexes with IgA as the antibody.

7077 IMMUNE REACTION IN THE GASTRIC MUCOSA: PASSIVE MUCOSAL ANAPHYLAXIS AND EXPERIMENTAL ULCER.

(Eng.) Kondo, M.; Kodama, M.; Kawai, K.; Masuda, M. (Dept. Medicine, Kyoto Prefectural Univ. Medicine, Kawaramachi-Hirokoji, Kamigyo-ku, Kyoto, 602 Japan). *Gastroenterol. Jpn.* 10(2):157-161; 1975.

Immune tissue injury in the dog gastric mucosa was investigated using a purified antigen-antibody system. Anti-bovine serum albumin (BSA) serum and normal rabbit serum (control), in 0.1 ml volumes, were injected into the mucosa of six dogs. Two hours later, 10 mg/kg BSA and 30 mg/kg pontamine sky blue 6B (PSB) were injected i.v. as a challenge. Blueing was observed only at the injection site at 30 min and 2 hr, and marked edema accompanied by massive bleeding in the mucosa were seen at 4-12 hr. The reaction was reduced at 24 hr. Blueing was also observed when, with all other procedures remaining the same, BSA (2 g) was given p.o. Histologically, marked cell infiltrations were observed in the mucosa and submucosa after 1 hr, and edema and massive bleeding, with the destruction of mucosal cells, were seen at 4-12 hr. The direct injection of soluble immune complex (0.1 ml) into the gastric mucosa produced an experimental ulcer in which the parietal cells were relatively resistant to the immune tissue damage. However, there were erosion and marked destruction of the mucosa, and numerous cellular infiltrations were seen. Using a purified antigen-antibody system, the passive cutaneous anaphylaxis technique, the authors obtained an immune reaction, "passive mucosal anaphylaxis," which was significant 4-8 hr after the challenge and was accompanied by massive hemorrhage, never seen in passive cutaneous anaphylaxis.

7078 PARIETAL CELL ANTIBODIES. PART II. CYTOTOXIC ACTIVITIES OF PARIETAL CELL ANTIBODIES. (Eng.) Kogawa, K. (Kyoto Natl. Hosp., Fushimi, Kyoto, Japan). *Gastroenterol. Jpn.* 10(1):52-64; 1975.

Cytotoxic activities of parietal cell antibodies (PCA) in normal human parietal cells were investigated, along with histochemical changes in the rat stomach after administration of rabbit anti-rat gastric mucosa (anti-RGM) sera. The PCA produced atrophy, blistering, and swelling in the protoplasm of the cells and karyopyknosis, thickening of the nuclear membrane, and condensation of nucleoli in the nucleus. Aggregation, swelling, and disintegration of the mitochondria plus vacuoles were often noted. The cytotoxic component was immunoglobulin G. Pylorus-ligated albino Wistar rats were injected through the tail vein with either 1.0, 0.5, or 0.1 ml rabbit anti-RGM sera. The sera had no effect on gastric secretion, but a few histochemical changes were demonstrated. However, they were transient and returned to normal within 60 min. Succinic dehydrogenase activities were most affected, decreasing 3 min after injection, followed by a gradual return to normal. Diphosphopyridine nucleotide values were also significantly decreased. Comparison between chronic active gastritis and chronic thyroiditis and the experimental results indicate that these disorders share identical immunologic aspects, and that some immunological mechanism(s) are involved in the pathogenesis of chronic active gastritis.

7079 EFFECTS OF METHYLPREDNISOLONE, GLUCAGON, AND ALLOPURINOL IN THE PROTECTION OF PANCREATICODUODENAL ALLOGRAFTS PERFUSED FOR TWENTY-FOUR HOURS. (Eng.) Tersingi, R.; Najarian, J. S.; Toledo-Pereyra, L. H. (P.O. Box 223, Univ. Minneapolis Hosp., Minneapolis, MN 55455). *Surgery* 78(5):599-607; 1975.

The effects of methylprednisolone, glucagon, and allopurinol as perfusate additives for pancreaticoduodenal segments during 24-hr preservation were studied in 60 dogs. Pancreaticoduodenal segments were removed from donor animals and subjected to hypothermic flushing and 24-hr preservation in modified cryoprecipitated pooled canine plasma. Methylprednisolone (2 g/l perfusate), allopurinol (250 mg/l), glucoagon (10 mg/l), methylprednisolone plus allopurinol, or methylprednisolone plus glucagon were added to the perfusate. The flow rate during perfusion was significantly higher in the segments perfused with methylprednisolone, alone or in combination with other drugs, than that with allopurinol or glucagon alone. During perfusion, the secretion of pancreaticoduodenal juice, amylase, and trypsin was also significantly higher in the groups perfused with methylprednisolone, alone or in combination. After 24 hr of perfusion, all pancreaticoduodenal grafts exhibited a 15-30% weight gain, except those perfused with methylprednisolone and glucagon, which had only a 10-15% weight gain. From the beginning of transplantation, the pancreaticoduodenal grafts perfused with methylprednisolone and glucagon secreted clear mucous pancreaticoduodenal juice, while those perfused with the other drug combinations temporarily secreted serohemorrhagic juice. The mean survival times of the recipient dogs receiving control segments, segments treated with methylprednisolone, allopurinol, glucagon, methylprednisolone plus allopurinol, or methylprednisolone plus glucagon were 15.0, 18.0, 7.5, 13.5, and 22.0 days, resp. The results show that the addition of methylprednisolone to the perfusate prevents the appearance of necrotic changes after transplantation of preserved grafts. The best results were obtained after transplant of segments perfused with methylprednisolone combined with glucagon.

7080 PORCINE PANCREATIC TRANSPLANTATION. I. AUTOTRANSPLANTATION OF DUCT LIGATED SEGMENTS. (Eng.) Kyriakides, G. K.; Arora, V. K.; Lifton, J.; Nuttall, F. Q.; Miller, J. (Veterans Admin. Hosp., Minneapolis, MN 55417). *J. Surg. Res.* 20(5):451-460; 1976.

A method of autotransplantation of duct-ligated pancreatic segments in female pigs is described, and the effect of various postoperative treatments on survival, viability of grafts, morphologic changes, peripancreatic fluid volume, and insulin production by the grafts is reported. Treatment groups were given one of the following: (1) antibiotics and heparin only (controls), (2) Solu-Medrol steroid (500 mg/day, i.m.), (3) irradiation (5,000 R), (4) Solu-Medrol + irradiation, (5) Trasylol (perfusion with 100,000 U in 250 ml, then 100,000 U/day, i.m.), (6) glucagon (1 mg preoperatively, i.v., then 4 mg twice daily, i.m.), and (7) glucagon + steroid. Animals were sacrificed 1-2 weeks later. Of 24 control animals, 19 survived, 14 of 19 had viable grafts, and 12-14 showed severe morphological changes. Of 17 animals in group (2), 15 survived; 13/15 had viable grafts, with 0 of 13 showing severe morphological changes. In groups (3) and (4), four of six survived and three of four had viable grafts in each group; only one in group (3) showed severe morphological changes. In group (5), six of seven survived, three of six with viable grafts, all of which showed severe morphological changes. All five animals in group (6) survived, two with viable grafts, both of which had severe morphological changes. All six animals in group (7) survived with viable grafts and no instances of severe morphological changes. Insulin production was preserved and continued exocrine function resulted in an accumulation of large volumes of a peripancreatic fluid as a result of Solu-Medrol treatment. When glucagon was added, there was a total inhibition of exocrine function and negligible peripancreatic fluid accumulation, but insulin production continued and the grafts appeared morphologically normal. The implications of the use of high-dose steroid therapy and glucagon to prevent acute damage to duct-ligated pancreatic autografts are that major obstacles to the use of this method in allografts can now be removed.

7081 RADIONUCLIDE IMAGING OF INTESTINAL INFARCTION IN DOGS.

(Eng.) Schimmel, D. H.; Moss, A. A.; Hoffer, P. B. (Dept. Radiology, Univ. California Sch. Medicine, San Francisco, CA). *Invest. Radiol.* 11(4):277-281; 1976.

In vitro and *in vivo* radionuclide imaging was used to detect large and small bowel infarcts in 10 mongrel dogs. A no. 5 French polyethylene catheter was placed in the superior mesenteric artery in seven dogs and in the caudal mesenteric artery in three. Infarction was produced by injection of ceramic microspheres into either artery, followed by immediate removal of the catheter. Immediately following injection, 15 mCi of ^{99m}Tc-pyrophosphate was injected i.v. or intra-arterially, and abdominal scintigrams were taken. Four dogs had the radionuclide injected i.v. after embolization of either the large or small bowel. A second dose of the radionuclide was given after 24 hr, and a second imaging was done 26 hr after infarction. The bowel was then removed and scanned *in vitro*. Six dogs were given the radionuclide intra-arterially, and the same procedure was followed. In three dogs, tissue samples were counted by scintillation counter. All 2-hr control abdominal scintigrams were normal. Of the four dogs given i.v. radionuclide, only one showed abnormal uptake. An abnormal segment of colon was found at the site of the positive image, and *in vitro* scanning confirmed the increased uptake of this segment. This dog alone had a positive external scan, but all had a positive *in vitro* image. The presence of infarction in the positive segments was pathologically confirmed. Of the six dogs given the radionuclide intra-arterially, all had positive *in vivo* scans. Laparotomy showed grossly infarcted bowel in the positive areas. All *in vitro* scans showed areas of increased uptake, which were pathologically demonstrated to be infarcted areas. The *in vivo* scintigrams were superior to those of dogs injected i.v. *In vitro* counting in the one dog given the radionuclide i.v. showed a radioactivity ratio (counts/g) for infarcted to uninfarcted small bowel of about 2:1. In the two remaining dogs of the group injected intra-arterially, the ratio was 6:1. One had a small bowel, and the other a colonic infarction. No calcium foci were detected in any histologic sections. The results suggest that ^{99m}Tc-pyrophosphate may be a useful agent for imaging acute, external bowel infarctions; however, additional work is necessary to determine if a correlation exists between its localization and the degree of tissue damage.

7082 DUODENUM-, ILEUM- AND COLON-SPECIFIC ANTIGENS.

(Eng.) Rabin, B. S. (Dept. Pathology, Scaife Hall, Univ. Pittsburgh, Pittsburgh, PA 15261). *Int. Arch. Allergy Appl. Immunol.* 50(2):133-141; 1976.

The presence of duodenum-, ileum-, and colon-specific antigens in germ-free rats was investigated. An antigen extract was prepared from each intestinal section and from the liver. Four rabbits were immunized with each antigen, and the resulting antisera were tested unabsorbed, absorbed with liver, and absorbed with both liver and bowel segment extracts. All antisera produced several precipitation lines with each extract. The presence of organ-specific antigens was evaluated by reacting the liver-absorbed anti-intestine antisera against rabbit and guinea pig intestinal tissue extracts. Three of the nine sera gave precipitation reactions with both guinea pig and rabbit intestine extracts. There was a single precipitation line that showed a reaction of identity with duodenum, ileum, and colon of both species. This common antigen was also found in rat duodenum, ileum, and colon. Absorption of the antisera with rat ileum removed reactivity to all rabbit and guinea pig intestine extracts. The results show that at least one each of duodenum-, ileum-, and colon-specific antigen are present in germ-free rat intestine. In addition, there is an intestine-specific antigen present at all levels of the bowel. The intestine-specific antigens are in the goblet cell mucus. The cytoplasm of the epithelial cells contains antigen that is shared by other tissues.

7083 A NEW SUBSTRATE FOR THE RAPID EVALUATION OF ENTERIC MICROBIAL OVERGROWTH.

(Eng.) Wolgemuth, R. L.; Hanson, K. M.; Zassenhaus, P. H. (Rohm and Haas Res. Lab., Spring House, PA 19477). *Am. J. Dig. Dis.* 21(9):821-826; 1976.

The para-aminobenzoic acid (PABA) conjugate of cholic acid was used as a substrate for the detection of altered bile acid metabolism. Forty male Sprague-Dawley rats were divided into three groups. One group was given a massive, oral broad spectrum antibiotic regimen to clear the digestive tract of microflora, a second group had the bowel surgically disrupted to cause bacterial overgrowth in the upper small intestine, and a third group served as a control. The rats were given the PABA conjugate either p.o. or by intracecal injection. Urine was collected at 2, 6, 9, 12, and 24 hr, and PABA excretion was determined. The hydrolysis of substrate was determined by measuring the release of free PABA from the substrate *in vitro* during incubation with *Clostridium welchii* powder. The incubation showed that bacteria containing cholyl hydrolases do hydrolyze the PABA conjugate. The K_m from the Lineweaver-Burk plot was 3.62 mM, which compares well with the K_m for natural substrates. When Na-PABA was given alone p.o., the largest percentage of the dose appeared in the urine of control rats during the initial 2-hr period (1.19 ± 0.13 mg). When the cecal route was used, over half the total PABA recovery occurred during the first 2 hr (0.80 ± 0.12 mg). The antibiotic regimen did not significantly affect absorption or excretion. The PABA conjugate, in contrast, was apparently not hydrolyzed in the antibiotic-treated rats, and negligible amounts were recovered. Oral administration to normal rats resulted in excretion of significant amounts of PABA only by the 12-hr collection period. Oral administration of the conjugate to rats with bacterial overgrowth resulted in a 250% greater excretion of PABA (1.11 ± 0.15) than that of the controls at the 6-hr collection (0.42 ± 0.05 mg). Since the mortality rate in the rats with bacterial overgrowth exceeded 50% by the third day, cecum injected normal rats were used as a model for this *in vivo* hydrolysis. The PABA tracer was excreted at the early interval, and by 6 hr, these rats excreted 330% as much PABA as the normal rats given the conjugate p.o. The antibiotic-treated rats again excreted negligible amounts of PABA in all cases. The results show that the conjugated PABA is a sensitive substrate for detection of deconjugation of bile salts by bacterial enzymes.

7084 BILE ACID BIOTRANSFORMATION RATES OF SELECTED GRAM-POSITIVE AND GRAM-NEGATIVE INTESTINAL ANAEROBIC BACTERIA. (Eng.) Hylemon, P. B.; Stellwag, E. J. (Dept. Microbiology, Health Sciences Div., Virginia Commonwealth Univ., Richmond, VA 23298). *Biochem. Biophys. Res. Commun.* 69(4): 1088-1094; 1976.

The rates of selected bile acid transformations by growing cultures, cell suspensions, and lysozyme-treated cell suspensions of *Eubacterium aerofaciens* and *Bacteriodes fragilis* are reported. Growing cultures of *B. fragilis* converted 70%-80% cholate to 7-ketodeoxycholate (7-KD) in 24-36 hr, but *E. aerofaciens* cultures converted only about 6%-8% in 72 hr. Lysozyme-treated *B. fragilis* showed a twofold increase in the conversion of cholate to 7-KD. No detectable cholate transformations occurred in cell suspensions of *E. aerofaciens* during 6-hr incubation, but deoxycholate was converted rapidly to 12-ketolithocholate (12-KL) and lysozyme treatment increased the conversion of cholate to 7-KD more than a 100-fold. The rate of conversion of deoxycholate to 12-KL increased only twofold in the same lysozyme-treated cell suspensions. In *B. fragilis*, the total activity of both NAD-dependent 7-α-hydroxysteroid dehydrogenase and bile salt hydrolase (BSH) increased markedly in spheroplast fractions from cells in the stationary growth phase. Both enzymes were detected in the spheroplast lysate and the Triton-soluble washed membrane fractions, but only BSH was found in the spheroplast medium. It is suggested that although the physiological significance of the different locations of bile acid-transforming enzyme is not clear, transformation reactions may occur in or on the bacterial cytoplasmic membrane.

7085 EFFECT OF BRADYKININ ON THE RAT MESENTERIC MICROCIRCULATION. (Rus.) Chernukh, A. M.; Aleksandrov, P. N.; Timkina, M. I. (Inst. General Pathology and Pathological Physiology, USSR Acad. Medical Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 81(3):259-261; 1976.

7086 EXPERIMENTAL GUT ANASTOMOSES AND THEIR REVASCULARIZATION. (Eng.) Nakanishi, H. (Dept. Surgery, Univ. Queensland, Clinical Sciences Building, Qld 4029, Australia). *Aust. N.Z. J. Surg.* 45(3):309-314; 1975.

7087 DISTRIBUTION OF CHLORPROMAZINE IN THE GASTROINTESTINAL TRACT OF THE RAT AND ITS EFFECT ON ABSORPTIVE FUNCTION. (Eng.) Sundaresan, P. R.; Rivera-Calimlim, L. (Univ. Rochester Sch. Medicine and Dentistry, Rochester, NY 14642). *J. Pharmacol. Exp. Ther.* 194(3):593-602; 1975.

7088 MOLECULAR BIOLOGY OF AMOEBIC ENCYSTMENT. (Eng.) Murti, C. R. K. (Central Drug Res. Inst., Lucknow, India). *Indian J. Med. Res.* 53(6): 757-767; 1975.

7089 TREATMENT OF SCHISTOSOMIASIS MANSONI AND JAPONICA IN BABOONS WITH TUBERCIDIN GIVEN BY DIRECT INTRAVENOUS INJECTION. (Eng.) Jaffe, J. J.; Doremus, H. M.; Dunsford, H. A.; Meymarian, E. (Univ. Vermont Coll. Medicine, Burlington, VT 05041). *Am. J. Trop. Med. Hyg.* 24(5):835-842; 1975.

7090 ENERGY LEVELS IN SPLANCHNIC ORGANS FOLLOWING SEVERE HAEMORRHAGE AND REINFUSION [Abstract]. (Eng.) Keaveny, T. V.; Cunningham, S. K.; Fitzgerald, P. (Dept. Surgery, Univ. Coll., Dublin, Ireland). *Br. J. Surg.* 62(8):665; 1975.

7091 BILE DUCT RECONSTRUCTION. STUDY IN ANIMAL EXPERIMENT. (Ger.) Prokscha, G. W. (Chir. Klinik rechts der Isar der Techn. Univ., Ismaningerstr. 22, 8 Munich 80, W. Germany). *Fortschr. Med.* 94(4):210; 1976.

7092 RESISTANCE OF REGENERATING LIVER TO HEPATOTOXINS. (Rus.) Uryvaeva, I. V.; Faktor, V. M. (Inst. Developmental Biology, USSR Acad. Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 81 (3):283-285; 1976.

7093 STUDIES ON THE FUNCTIONING OF PIG LIVERS PERFUSED WITH HUMAN BLOOD IN MECHANICAL RECIRCULATION EXPERIMENTS: COMMUNICATION 1. EXPERIMENTAL LAYOUT, ELIMINATION OF INDOCYANINE GREEN, GALACTOSE, BILIRUBIN AND AMMONIA, UREA SYNTHESIS, BILE SECRETION. (Ger.) Zipprich, B.; Nilius, R.; Baust, G.; Bunge, H.-J.; Pauer, H.-D.; Schlesinger, E. (I. Med. Univ.-Klinik, 402 Halle [Saale], Leninallee 22, E. Germany). *Z. Gesamte Inn. Med.* 31(11): 364-368; 1976.

7094 PRELIMINARY OBSERVATIONS ON ALTERATIONS IN PANCREATIC BLOOD FLOW, USING RUBIDIUM ^{86}Rb, IN EXPERIMENTAL ACUTE PANCREATITIS. (Ita.) Valente, U.; Prior, C.; Casaccia, M.; Campisi, C.; Arcuri, V.; Pellicci, R.; Barabino, C. (Istituto di Clinica Chirurgica [R] dell'Universita di Genova, Genova, Italy). *Minerva Chir.* 31(5):167-175; 1976.

7095 INCIDENCE OF STRESS ULCER AND GASTRIC JUICE SECRETION AFTER TRUNCAL AND SELECTIVE VAGOTOMY IN RATS. (Ger.) Schramm, H.; Schwalbe, J.; Liess, J.; Vogler, C. (Chirurgische Universitatsklinik, DDR-69 Jena, Bachstrasse 18, E. Germany). *Z. Exp. Chir.* 9(1):47-56; 1976.

7096 THE ROLE OF THE ANTRUM IN THE PATHOGENESIS OF STRESS ULCER IN THE RAT. (Ger.) Schramm, H.; Rupprecht, H. (Chirurgische Universitatsklinik, DDR-69 Jena, Bachstrasse 18, E. Germany). *Z. Exp. Chir.* 9(1):41-46; 1976.

7097 ROLE PLAYED BY CATECHOLAMINES IN THE MECHANISMS OF THE INFLUENCE OF THE THYROID GLAND ON THE APPEARANCE OF "STRESS" AND "STEROID" ULCERS OF THE STOMACH. (Rus.) Rosolovsky, A. P. (Ternopol Medical Inst., Ternopol, USSR). *Probl. Endokrinol. (Mosk.)* 22(1):64-67; 1976.

7098 ACTION OF GASTRODUODENAL DRESSING ON THE CELLULAR METABOLISM OF DIGESTIVE MUCOSA. HISTOCHEMICAL AND ENZYMATICAL STUDY DURING STRESS ULCER. (Fre.) Wegmann, R.; Bergerot-Blondel, Y. (Institut d'Histochimie Medicale, U.E.R. Biomedicale Saints-Peres, Universite Rene-Descartes, 45, rue des Saints-Peres, 75270 Paris Cedex 06, France). *Ann. Histochim.* 21(1):1-14; 1976.

7099 VALUE OF LOCAL NOREPINEPHRINE IN THE MANAGEMENT OF BLEEDING DUE TO ACUTE GASTRIC ULCERS. (Spa.) Pierri, N. C.; Villar, B. M.; Reyes, I.; Varela, J. A.; Yametti, L.; Bonaba, R.; Fossati, C. G. (Departamento de Cirugia, Facultad de Medicina, Av. Gral. Flores 2125, Montevideo, Uruguay). *Cir. Uruguay* 45(3):278-280; 1975.

7100 EXPERIMENTAL GASTROJEJUNOCOLIC FISTULA: PATHOLOGICAL FEATURES. (Ita.) Perbellini, A.; Montolli, R.; Agugiaro, S.; Mora, L.; Faccioli, G. (Istituto di Patologia Speciale Chirurgica e Propedeutica Clinica, Universita degli Studi di Padova, Padova, Italy). *Acta Chir. Ital.* 32(1):107-112; 1976.

7101 EFFECT OF THE INSUFFICIENCY OF THE ILEOCECAL VALVE ON THE SMALL INTESTINE OF THE CAT. (Spa.) Martinez-Almoyna, C.; Claver, M. G.; Brea, M. L.; Monereo, J. G. (Cirugia Pediatrica, Clinica Infantil "La Paz," Departamento de Cirugia, Universidad Autonoma de Madrid, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(4):407-424; 1976.

7102 ABOUT THE INFLUENCE OF Clostridium perfringens (TYPE C) BETA-TOXIN ON THE MOTILITY OF INTESTINE SEGMENTS (IN VITRO): I. COMMUNICATION. (Ger.) Parnas, J. (State Veterinary Serum Lab., 27, Bulowsvej, DK-1870 Copenhagen, Denmark). *Zentralbl. Bakteriol.* [*Orig. A*] 234(2):243-246; 1976.

7103 THE METHYLATION OF MERCURIC CHLORIDE BY HUMAN INTESTINAL BACTERIA. (Eng.) Rowland, I. R.; Grasso, P.; Davies, M. J. (British Industrial Biological Res. Assoc., Woodmansterne Road, Carshalton, Surrey, SM5 4DS, England). *Experientia* 31(9):1064-1065; 1975.

7104 DIFFUSION OF VITAMIN B_{12} AND BROMOSULFOPHTHALEIN FROM ISCHEMICALLY DAMAGED PROXIMAL SMALL INTESTINE IN THE DOG. (Ger.) Frauchiger, J. P.; Staubli, H. U. (Universitatsklinik fur viszerale Chirurgie, Inselspital, CH-3010 Bern, Switzerland). *Helv. Chir. Acta* 43(1/2):187; 1976.

7105 THE ASSOCIATION IN MICE OF INTESTINAL INFLAMMATION, ELEVATED LEVELS OF PHOSPHOLIPASE B, AND EXPULSION OF Trichinella spiralis. (Eng.) Larsh, J. E., Jr. (Sch. Public Health, Univ. North Carolina, Chapel Hill, NC 27514). *Wiad. Parazytol.* 21(4/5):679-682; 1975.

7106 TUMOR-ASSOCIATED ANTIGENS OF INTESTINAL CARCINOMAS IN THE RAT [Abstract]. (Eng.) Martin, F.; Martin, M. S.; Bordes, M.; Knobel, S.; Bastien, H. (Centre de Lutte contre la Cancer, 7, Boulevard Jeanne d'Arc, F-21033 Dijon, France). *Digestion* 10(3):23; 1974.

See also, 6936, 6964, 6993, 7231, 7458.

DIAGNOSTIC PROCEDURES

7107 CARCINOEMBRYONIC ANTIGEN (CEA): A PROSPECTIVE CLINICAL TRIAL IN PATIENTS WITH GASTROINTESTINAL CANCER. (Eng.) Kjaer, M.; Fischerman, K. (Dept. Surgical Gastroenterology C, Rigshospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 37):99-106; 1976.

Plasma carcinoembryonic antigen (CEA) was determined in 29 patients with colorectal cancer, in 37 with gastric cancer, and in 100 blood donors. Using 5 ng/ml as the upper limit of normal, 98/100 blood donors had CEA levels in the normal range (the two elevated levels were 5.1 and 5.4 ng/ml) and 79/100 had levels below 2.5 ng/ml. The level corresponded positively with the degree of cigarette smoking among smokers ($p < 0.001$) and was higher than that in nonsmokers. There were elevated CEA levels in 14/29 colorectal cancer patients and 12/37 stomach cancer patients. For the colorectal cancer patients, numbers were too small to allow statistical correlation of the CEA level with clinical stage of disease, but among the stomach cancer patients, those with disseminated disease had statistically higher levels than did patients with localized disease. CEA determination allowed identification of radically resectable colorectal cancer in 9/23 and of radically resectable gastric cancer in 7/27. Five patients with colorectal cancer (but no patient with stomach cancer) fulfilled the requirements for monitoring. After observation for up to 14 months, a definitive correlation between CEA levels and clinical course was demonstrated in 1/26 patients submitted to macroscopically radical surgery for colorectal cancer. In 2/7 patients with gastric cancer, the CEA values were completely misleading. CEA determination is not recommended as a standard parameter for following up cases of gastrointestinal cancer.

7108 GASTROINTESTINAL HEMORRHAGE FROM ADHESION-RELATED MESENTERIC VARICES. (Eng.) Moncure, A. C.; Waltman, A. C.; Vandersalm, T. J.; Linton, R. R.; Levine, F. H.; Abbott, W. M. (Massachusetts General Hosp., Boston, MA 02114). *Ann. Surg.* 183(1):24-29; 1976.

Six cases of gastrointestinal hemorrhage from submucosal intestinal varices in the region of the superior and inferior mesenteric veins are reported. The patients ranged in age from 16 to 71 yr (5 women, 2 men). The patients presented with frank rectal bleeding or tarry stools without hematemesis or recoverable blood from nasogastric aspiration. All had undergone previous intra-abdominal surgery, and all had portal hypertension. The presence of varices was suggested by the venous phase of mesenteric arteriography. At operation, all patients were found to have large venous communications between portal and systemic venous circuits through postoperative adhesions. The point(s) of bleeding was traced to mucosal erosion over large submucosal varices within the bowel, adherent to postoperative scars or adhesions. In the first patient, the distal ileum exhibited extremely dilated veins within its mesentery, extending over the surface of the intestine up into an adhesion, which bound the ileum to the left pelvic wall at the site of a peritoneal incision for a hysterectomy performed 18 yr previously. A 1-foot segment of ileum was resected, the very large vein was doubly ligated, and a standard end-to-end small bowel anastomosis was performed. In the second patient, massively dilated veins in the mesentery of the distal ileum communicated with enormous systemic venous structures throughout the area of an ovarian cystectomy performed 18 yr previously. Distal ileectomy and right colectomy were performed with end-to-end primary anastomosis. In the third patient, a loop of ileum was adherent to a laparotomy incision, made 19 yr previously, with an extremely large dilated mesenteric vein leading from it. Dense adhesions with venous communications extended from this portion of the ileum into the abdominal wall. The involved ileal segment was freed, the dilated mesenteric vein ligated and divided, and the raw surface of ileum turned in with interrupted fine sutures. In the next two patients, the varices were associated with a cholecystojejunostomy site and a laparotomy incision, resp.; the former was treated by a mesocaval shunt procedure, and the latter by severing the vascular adhesions between a jejunal loop and the abdominal wall and constructing a saphenous vein graft between a mesenteric vein and the inferior vena cava. A 2-foot ileal segment was adherent to the abdominal wall at the point of an appendectomy incision in the last patient; resection of the involved bowel was performed with an end-to-side anastomosis, the dilated ileocolic vein was dissected back to the base of the mesentery, and an end-to-side anastomosis was performed between this vein and the right iliac vein. The authors conclude that the best approach to the treatment of this rare site of gastrointestinal hemorrhage is a direct resection of the involved bowel followed by portal-systemic decompression.

7109 UNUSUAL COMPLICATION OF PANCREATITIS IN ANGIOGRAPHIC VISUALIZATION. (Ger.) Chvojka, J. (Rontgenologische Abteilung, Militarkrankenhaus, Pilzen, Czechoslovakia). *Fortschr. Geb. Rontgenstr. Nuklearmed.* 124(2):131-134; 1976.

A case report of an adventitious finding in an angiographic survey of postoperative pancreatitis is presented. A Billroth II gastric resection for duodenal ulcer had been performed on a 20-yr-old man, with onset of pancreatitis 4 days after surgery. Subsequent celiac artery angiography found a suspected subdiaphragmatic abscess. Unexpected findings included a spherical structure in the middle of the splenic artery and increased vascularization in the body and tail of the pancreas. Celiac and superior mesenteric arteriography 5 weeks later found additional cavity-like structures in the pancreatic body and persistent hypervascularization. The same picture was revealed in control angiography 9 and 18 months postoperatively. Through repeated exacerbation of the pancreatitis, which might have been iatrogenic preoperatively, the arteries and veins became fixed to the pancreas by adhesions, eliciting vascular wall inflammations and pseudoaneurysms.

7110 SECRETIN AND EPINEPHRINE COMBINED IN CELIAC ANGIOGRAPHY. (Eng.) Uden, R. (Dept. Diagnostic Radiology, St. Gorans Sjukhus, S-112 81

Stockholm, Sweden). *Acta Radiol.* [*Diagn.*] *(Stockh.)* 17(1):17-40; 1976.

The diagnostic value of the combined effect of secretin and epinephrine in pancreatic angiography was investigated in 39 patients (6 with carcinoma of the pancreas, 2 metastases in the pancreas, 2 metastases behind the pancreas, 9 pancreatitis, and 1 schwannoma in the duodenal wall; 19 having a normal pancreas, but cancer in other sites, with liver metastases in 12). In all cases, an additional angiographic series was performed without the pharmacodynamic substances. A third series was performed in 32 cases, in 23 with secretin alone and in 9 with epinephrine alone. Secretin (90-150 clinical U) was injected through the catheters 1.5-2 min before the injection of contrast medium; 4-6 μg of epinephrine was injected 15-20 sec before the contrast medium. With secretin and epinephrine combined, and often with secretin alone, small veins, such as the choledochal, the common hepatic, and pancreaticoduodenal veins, were demonstrated. If there was any filling of small veins in or around the head of pancreas, these three, at least, should be identified. Secretin plus epinephrine caused a marked contrast of the abnormal veins and capillaries because a larger amount of contrast medium reached the pancreas. Abnormal veins became filled in every case of pancreatic carcinoma. The demonstration of abnormal veins appears to be a better sign of carcinoma than the four classical signs (vessel displacement, artery stenosis, abnormal arteries, and increased contrasting effect of the tumor). The optimum technique for pancreatic angiography is to include one series with secretin alone, to adequately fill the tail of the pancreas and the splenic and portal veins, and one series with secretin and epinephrine combined.

7111 ENDOSCOPIC RETROGRADE INTRAHEPATIC CHOLANGIOGRAPHY IN LIVER DISEASES. (Eng.) Ayoola, E. A.; Vennes, J. A.; Silvis, S. E.; Rohrmann, C. A.; Ansel, H. J. (Dept. Internal Medicine, Veterans Admin. Hosp., 54th St. and 48th Ave. South, Minneapolis, MN 55417). *Gastrointest. Endosc.* 22(3):156-159; 1976.

The radiographic characteristics of the intrahepatic bile duct system were determined in 56 patients who had nearly simultaneous endoscopic retrograde intrahepatic cholangiography (ERIC) and liver biopsy. All patients with cirrhosis (17) showed abnormalities of ERIC: pruning, stenosis, and irregularity. Ductular displacement was seen in about one-third. Only a third of the 12 patients with portal triaditis and/or fibrosis showed any abnormality. Nine of 10 patients with chronic cholangitis had an abnormal ERIC, primarily, dilation of the intrahepatic ducts. The duct configuration was normal in all cases. In two sclerosing cholangitis patients, extrahepatic focal stenosis with intervening sacculations (beading) and pruning were observed. The findings were abnormal in all seven cases of malignant tumors: marked duct displacement (5), giving rise to a mass effect (3), duct dilatation (5), diffuse stenosis (2), and abrupt branch obstruction (2). Two patients with fatty metamorphosis were indistinguishable from normal except for subtle straightening of the ductular branches. A case of chronic active hepatitis and of hemangioma of the liver appeared normal. It is suggested that attempts should be made to fill the biliary system beyond the bifurcation in order to avoid overlooking abnormalities of the intrahepatic ducts.

7112 INDICATIONS, CLINICAL VALUE AND COMPLICATIONS OF ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY. (Eng.) Kessler, R. E.; Falkenstein, D. B.; Clemett, A. R.; Zimmon, D. S. (Manhattan Veterans Admin. Hosp., New York, NY). *Surg. Gynecol. Obstet.* 142(6):865-870; 1976.

The indications, clinical value, and complications of endoscopic retrograde cholangiopancreatography (ERCP) were assessed in a series of 1,089 procedures performed on 938 patients in two hospitals. The procedure was indicated because of cholestasis in 30.0% and 37.3% of the patients in the respective hospitals, pancreatic disease in 22.6% and 16.9%, gallbladder disease in 9.1% and 4.5%, postcholecystectomy syndromes in 9.8% and 21.4%, and abdominal pain in 26.8% and 19.9%; ERCP was indicated in 1.7% in one hospital for the treatment of choledocholithiasis. The endoscopic retrograde pancreatogram of a patient in whom ERCP distinguished technical failures after a distal pancreaticojejunostomy from progression of an underlying pathologic condition of the duct is presented. In a second patient, ERCP was useful in the detection of an occult choledocholithiasis and the identification of anatomic variants of the biliary tree. In several patients, the site and cause of postoperative biliary fistulas were clearly defined. ERCP was successful in diagnosing the disease in 75.2% of all patients. Diagnostic studies were achieved in 4.4% of these patients by virtue of endoscopic findings, and in 45.4% by cannulation of both pancreatic and biliary ducts. In 25.4%, a single duct demonstrated a diagnostic pattern. ERCP failed to be useful in the diagnosis in 24.8% of the patients. There were two deaths among the 938 patients from sepsis after ERCP, when prompt surgical relief of obstruction was not accomplished. It is concluded that ERCP is an invaluable tool for the diagnosis and management of pancreatic and biliary tract diseases.

7113 INTRAVENOUS CHOLEGRAPHY AND DIAPHRAGMATIC MOVEMENTS IN THE DIFFERENTIAL DIAGNOSIS OF ACUTE CHOLECYSTITIS. (Ger.) Kruse, V. (Kong Georgs Vej 26, 9000 Aalborg, Skorranget 4, Denmark). *Fortschr. Roentgenstr.* 122(6):554-557; 1975.

The problem of common duct and gallbladder visibility in differential diagnosis with i.v. cholegraphy (IVC) is examined. The clinical sample included 79 patients with symptoms suggesting cholecystitis. Biligrafin-filling studies were supplemented by tomography in equivocal cases and special attention was directed to the effect of relative right and left diaphragmatic mobility on the bile ducts, should acute cholecystitis involvement of the pleuroperitoneum be present. Group 1 consisted of 55 cholecystectomized patients with histologically confirmed diagnoses, and group 2 comprised 24 nonsurgical cases with uncertain clinical, laboratory, or radiological diagnoses. The IVC excretion pattern for group 1 included visualization of the common duct and gallbladder in 11, common duct visualization only in 34, and visualization of neither in 10. Of the 11 patients with gallbladder-common duct presentations, 5 had chronic cholecystitis and 4 had chronic cholecystitis plus acute pancreatitis. Of the 34 with common duct presentations only, 27 had acute cholecystitis, 3 had chronic cholecystitis with fibrosis, and 2 had acute pancreatitis plus chronic cholecystitis with fibrosis. Among the 10 negative cases were 6 of acute cholecystitis, 1 of chronic cholecystitis plus acute pancreatitis, 1 of chronic cholecystitis with fibrosis, 1 with adenocarcinoma in the transverse colon with liver metastases, and 1 with a liver abscess. The IVC pattern in group 2 included gallbladder and common duct visualization in 12 cases, 3 of which had acute pancreatitis and 4 had inconclusive diagnoses; there was common duct visualization only in 6, each with acute cholecystitis. There was no visualization of either the gallbladder or common duct in 6, 3 of whom had acute cholecystitis. In 11 of the 34 surgical cases with confirmed acute cholecystitis, movement in the right diaphragm was reduced below movement in the left; this occurred in only 1 of the 34 cases where there was no acute cholecystitis (liver abscess, $p < 0.025$). Normal diaphragmatic motility was found in 10 of the 34 cases with acute cholecystitis and 12 of the 34 without. Although gallbladder opacification was absent in a majority of cases of acute cholecystitis, the differential diagnostic value of IVC must depend on supplementation by diaphragmatic mobility and other studies.

7114 HEPATOSPLENOGRAPHY BY INTRAVENOUS INJECTION OF A NEW IODIZED OILY EMULSION.

(Eng.) Laval-Jeantet, M.; Lamarque, J. L.; Dreux, P.; Laval-Jeantet, A. M.; Launay, J. (Hopital Saint-Louis, F-750 10 Paris, France). *Acta Radiol.* [*Diagn.*] *(Stockh.)* 17(1):49-60; 1976.

The results of hepatosplenography with i.v.-injected iodized lipid emulsion (AG 60 99) in 30 subjects are presented. In 12 subjects, AG 60 99 (0.8-1.8 ml/kg) was infused undiluted over an average period of 1 hr. In the remaining subjects, AG 60 99 was diluted in glucose serum (1:5) and infused over approximately 4 hr. Eighteen patients had Hodgkin's disease with possible metastases or other intrahepatic expanding lesions. The correct diagnosis of histologic lesions was established by hepatosplenography in 5 of 6 of these patients, and this procedure correctly established the diagnosis of a normal spleen in 12 of 14 patients. Hepatosplenography allowed determination of the site of the lesion and the thickness and state of the parenchyma surrounding the lesion; it revealed lesions of the dome or posterior surface, which could not be detected by laparoscopy. Side effects were seen in about 50% of the 30 patients. These included transient fever or a feeling of cold during the injection. Respiratory disturbances with dyspnea occurred in five patients with pulmonary abnormalities, and transient allergic reactions occurred in three. Blood samples were taken in 22 cases. Those patients (12) receiving AG 60 99 by injection showed a moderate drop in RBC (<10%). The most significant hematologic effect was a slight decrease in platelet count (10-20%). These effects were minor and transient; however, they contraindicate hepatosplenoportography in patients with coagulation disorders. The examination of serum lipid content in 12 cases demonstrated no abnormality after AG 60 99 injection. Renal elimination of the iodide was rapid (30% within 24 hr), and the contrast medium was seen in the bladder on films exposed the following day. Hepatography using iodized oily emulsions is a clinically valuable procedure, although it should be avoided in patients with liver insufficiency, coagulopathy, cardiac or cerebrovascular lesions, respiratory insufficiency, pulmonary lesions, or recent lymphography.

7115 RADIONUCLIDE LIVER SCANS IN TUMOR DETECTION. CURRENT CONCEPTS.

(Eng.) Spencer, R. P. (Univ. Connecticut Health Center, Farmington, CT 06032). *Cancer* 37(1):475-479; 1976.

Concepts in radionuclide liver scans in tumor detection are discussed in an effort to integrate various approaches to liver scanning and to place them in perspective. Because of the frequency of tumor metastasis to the liver, hepatic evaluation plays a key role in planning therapy. Dynamic radionuclide transit studies depend upon the dual blood supply of the liver (hepatic artery and portal vein) and can be a useful prelude to static imaging, as most intrahepatic tumors have a hepatic arterial blood supply. Since most tumors cannot accumulate a radioactive colloid, static views are usually obtained after the injection of particulates, which are accumulated by the reticuloendothelial system. A gross defect on the radiocolloid scan indicates the presence of an intrahepatic abnormality, but does not identify the nature of the lesion. Although radiocolloids have dominated liver scanning for years, other agents, particularly radiolabeled materials that bind to tumors, may develop into important adjuncts. Several agents that have been studied include ^{67}Ga-citrate, which enters the liver and spleen and has been used to localize internal abscesses, and radionuclide-labeled tumor antibodies. New approaches being investigated include radiolabeled enzyme substrates or inhibitors (iodoaminopterin, which binds to dihydrofolate reductase) and inhibitors of metabolic pathways (depression of gluconeogenesis by ^{131}I-diphenyleneiodonium). There are at least five other uses of liver scans in patients with tumors: searching for new metastatic lesions during therapy, screening for nonmalignant foci (infections) during therapy, estimating intrahepatic tumor growth, estimating the rate of regression of intrahepatic lesions after irradiation or chemotherapy, and allowing the correct placement of biopsy needles or of radiation therapy portals.

7116 RESULTS OF GASTRIC LYMPHOGRAPHY WITH SPECIAL REFERENCE TO GASTRIC CARCINOMA.

(Ger.) Schacht, U.; Junemann, A.; Becker, H. J.;

Huth, F.; Palomba, P. P.; Kremer, K. (Chirurgische Universitatsklinik A, 4000 Dusseldorf 1, Moorenstr. 5, Dusseldorf, W. Germany). *Dtsch. Med. Wochenschr.* 101(19):725-729; 1976.

Experiences with indirect gastric lymphography in patients with gastroduodenal ulceration and gastric carcinoma are described. The clinical sample included 35 cases of gastric carcinoma (23 men and 12 women; average age, 62 yr) and 17 cases of gastroduodenal ulcers. The carcinomas were localized in the antrum in 7 patients, on the lesser curvature in 8, on the greater curvature in 3, on the corpus-antrum boundary of the lesser curvature in 11, and on the boundary of the greater curvature in 2; 4 patients had residual stump carcinomas. Using a fiberglass endoscope, Lipoidol ultra-fluid was injected into 8-10 different sites in the gastric submucosa and readings were attempted at various times up to 72 hr. The flow of the contrast medium into the nodes followed an imaginary line on the long axis of the stomach, whose midpoint was sagitally between the two curvatures. The contrast medium tended to move in the direction of the nodes on the lesser curvature. In the carcinoma cases, the contrast medium required 14-24 hr to reach the second and third order ganglia. There was no visualization in 4 of the 35 patients and visualization was deficient in 3 patients. Among the others, there were 28, 21, and 15 presentations of the first three nodal orders, resp. The findings included 13 true positives, 6 true negatives, 3 false positives, and 2 false negatives. Surgery was performed on 31 patients. Histologically, the resection preparations showed submucosal edema and foreign body reactions (lipophagic granulomas and giant cell formations limited to the submucosa), but the mucosa and muscle layers were intact. In the 17 ulcer patients, visualization of nodal orders 1-3, resp., was achieved 13, 5, and 5 times. Half of the patients had unusually large nodes with loose structure and small droplets of contrast medium deposits; in the remaining ulcer patients, contrast medium either failed completely or the medium was deposited negligibly in generally very small nodes. In 10 healthy subjects, the first three nodal orders were visualized, resp., 10, 7, and 4 times; there were failures or deficient fillings. Lymphography can provide decisive indications for intervention.

7117 TRANSJUGULAR RETROGRADE PORTOGRAPHY. PRELIMINARY COMMUNICATION.

(Ger.) Thelen, M.; Janson, R.; Schulz, D.; Paquet, K. J.; Thurn, P.; Harler, B. (Radiologische Klinik der Universitat Bonn, Abteilung Chirurgie, 5300 Bonn, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 124(6):531-534; 1976.

Retrograde presentation of the portal system and liver parenchyma during transjugular liver diagnosis is described. The test sample included 14 patients with portal hypertension, and 9 with normal pressure. General anesthesia is preferred. The right internal jugular vein is punctured and a catheter is inserted into the right or left hepatic vein and passed under electrocardiograph control. The contrast medium passes through the sinusoids into the portal circulation. Manual injection pressure is sufficient to fill even the central sections of the portal system. On termination of the presentation, the catheter is retracted to the caval section of the hepatic vein, after which the contrast medium empties from the parenchyma, such that no deposits are detectable after 2-3 min. A small amount of extravasation was found at the catheter point. In cirrhosis, contrast medium depots remain for longer periods, due to poor parenchymal perfusion. The tissue injury involved in multiple attempts to find a portal branch in direct methods are avoided by the relatively noninvasive retrograde portography.

7118 OPTIMAL TOMOGRAPHIC TECHNIQUE TO DEMONSTRATE COMMON BILE DUCT STONES. AN IN VITRO STUDY.

(Eng.) Smith, G. R.; Loop, J. W.; Allan, T. N. K. (Dept. Radiology, Univ. Washington, Harborview Medical Center, 325 Ninth Ave., Seattle, WA 98104). *Am. J. Roentgenol.* 126(1):63-69; 1976.

To reevaluate cholangiography as produced by existing tomographic techniques, a phantom was exposed to a beam collimated to 4.5 x 5.2 inches in the following modes: 10 and 40 degrees linear; 6, 10, 20, and 36 degrees circular; 40 degrees transverse ellipsoidal; and 48 degrees hypocycloidal. Qualities of the phantom included dimensions and orientation of the "common bile duct;" iodide concentration of its contents; size, shape, number, position, and radiolucency of artificial common duct stones; thickness of the subject; and interposition of bowel gas. The 6- and 10-degree circular modes were the optimal methods for i.v. cholangiography with tomography within the technical limitations and constraints outlined. The 10-degree mode was superior in the presence of superimposed gas. It is concluded that 10-degree linear tomography is an efficient method for determining the level of the common bile duct, but is not the best one for obtaining image detail. Thin-section unidirectional or pleuridirectional modes were occasionally helpful in delineating fine detail. These had a narrow zone of focus and permitted very limited sampling within the usual zone of interest. These modes were also inefficient in determining duct level and produced less-useful image detail than 10-degree circular tomography for ducts of normal or slightly larger diameters. It is concluded that they are seldom indicated as the primary modality on tomography of the common duct.

7119 ULTRASONIC DIAGNOSIS OF ABDOMINAL ABSCESS.

(Eng.) Doust, B. D.; Doust, V. L. (Medical Coll. Wisconsin, 8700 W. Wisconsin Ave., Milwaukee, WI 53226). *Am. J. Dig. Dis.* 21(7):569-576; 1976.

The ultrasonic diagnosis of abdominal abscess is reviewed. The technique, the ultrasonic properties of different types of abscesses, the differential diagnosis of an abscess, and the relation of ultrasound to other diagnostic modalities are discussed. The frequency of ultrasound most commonly used for abdominal diagnosis is 2.25 million cycles per second. Most ultrasound abdominal studies can be completed in 20 min or less. Fluid collections are echo-free, well-defined structures that conduct sound very well. Intrahepatic abscesses can be demonstrated in conventional longitudinal and transverse scans. The uppermost parts of the right lobe must be examined by a subcostal, angled approach. Failure to demonstrate a hepatic abscess is good evidence that the liver does not contain an abscess larger than 2 or 3 cm in diameter; the newer greyscale scanners may make lesions smaller than 2 cm in diameter regularly demonstrable, but at present, the limit of reliable resolution has not been determined. Right-sided subphrenic abscesses may be purely subphrenic or may have an associated intrahepatic component. Where there is a subphrenic component, the liver is displaced medially from the lateral abdominal wall and downward from the diaphragm by an echo-free zone. Subhepatic abscesses are easily confused with the gallbladder, although the characteristic shape of the gallbladder will usually allow differentiation. The most difficult area of the abdomen in which to diagnose an abscess is the subphrenic area; the best approach is through the left lower ribs posteriorly and obliquely upward through the left kidney and the spleen. Pelvic abscesses can be seen by an oblique suprapubic approach, provided the bladder is distended. The gallbladder, fluid in a distended bowel loop, a urinoma or hematoma, loculated ascites, a pleural effusion, lymphoceles, or a pancreatic pseudocyst may be confused with an abdominal abscess. The presence of fluid lateral to the liver and the widespread nature of the process generally allow distinction of ascites from multiple abscesses. Differentiation from a pleural effusion depends on identification of the diaphragm, best achieved by longitudinal scans in the decubitus or upright positions. Overall, ultrasonic examination provides the best currently available means of identifying, localizing, and following the progress of intraabdominal fluid collections; reported accuracy is probably in excess of 90%.

7120 GASTROINTESTINAL DIAGNOSIS, NEW ASPECTS AND METHODS. (Ger.) Lux, G.; Belchlavek, D.; Koch, H. (Med. Univ.-Klinik, Krankenhausstr. 12, 852 Erlangen, W. Germany). *Fortschr. Med.* 94(16): 923-928; 1976.

7121 THE ROLE AND IMPORTANCE OF ENDOSCOPIC INVESTIGATION IN PREVENTION AND EARLY DIAGNOSIS OF DIGESTIVE TRACT DISEASES. (Pol.) Gala, J. (Sanatorium Zw. Zaw. Metalowcow 33, 370 Muszyna, Poland). *Wiad. Lek.* 28(14):1207-1212; 1975.

7122 DOUBLE CONTRAST EXAMINATION WITH INGESTED BARIUM. (Eng.) Niizuma, S; Kobayashi, S. (Niigata Prefectural Cancer Hosp., Niigata, Japan). *Acta Med. Biol.* 22(3/4):103-117; 1975.

7123 THE CHEMISTRY OF CARCINOEMBRYONIC ANTIGEN. (Eng.) Coligan, J.E.; Schnute, W. C., Jr.; Egan, M. L.; Todd, C. W. (City Hope Natl. Medical Center, Duarte, CA 91010). *Cancer* 36(6):2455-2459; 1975.

7124 CORRELATION OF IN VITRO AND IN VIVO METHODOLOGY FOR EVALUATION OF ANTACIDS. (Eng.) Smyth, R. D.; Herczeg, T.; Wheatley, T. A.; Hause, W.; Reavey-Cantwell, N.H. (Res. Lab., William H. Rorer, Inc., Fort Washington, PA 19034). *J. Pharm. Sci.* 65(7):1045-1047; 1976.

7125 BLOOD TESTS FOR CANCER: BETTER ALL THE TIME. (Eng.) Segal, H. L. (Univ. Rochester Sch. Medicine and Dentistry, Rochester, NY). *Consultant* 16(2):171-176; 1976.

7126 A DOUBLE CONTRAST RADIOLOGICAL STUDY OF COLIC LESIONS CAUSED BY METASTASES OR BY PROPAGATION OF A NEARBY CANCER. (Fre.) Bret, P.; Piante, M.; Cuche, C.; Sautot-Vial, B. (Hopital Edouard-Herriot, 3, place d'Arsonval, F 69374 Lyon Cedex 2, France). *Ann. Radiol. (Paris)* 19(2): 289-293; 1976.

7127 COMPARISON OF FIBEROPTIC ENDOSCOPY IN ACUTE UPPER GASTROINTESTINAL HAEMORRHAGE IN AFRICANS AND EUROPEANS. (Eng.) Wicks, A. C. B.; Thomas, G. E.; Clain, D. J. (Dept. Medicine, Univ. Rhodesia, Salisbury, Rhodesia). *Br. Med. J.* 4(5991): 259-260; 1975.

7128 THE DIAGNOSIS AND MANAGEMENT OF GASTROESOPHAGEAL REFLUX. (Eng.) Cohen, S. (Univ. Pennsylvania Hosp., Philadelphia, PA). *Adv. Intern. Med.* 21:47-75; 1976.

7129 DIAGNOSTIC VALUE IN LIVER DISEASES OF THE SELECTIVE CHEMICAL PRECIPITATION OF SERUM PROTEINS. (Fre.) Badin, J.; Cerf, G.; Cachin, M. (INSERM 18, Hopital Lariboisiere, 6, rue Guy Patin, 75475 Paris Cedex 10, France). *Ann. Gastroenterol. Hepatol.* 11(6):447-466; 1975.

7130 THE BLOOD LIPID PICTURE IN LIVER PATIENTS. (Ita.) Ferlito, S.; Mangiagli, P.; Tranchida, M. L.; Polizzi, G. (Dept. Metabolic Diseases, Univ. Catania, Catania, Italy). *Minerva Gastroenterol.* 21(4):226-234; 1975.

7131 CLEARANCE USED AS A MEASURE OF HEPATIC SUPPLY. (Fre.) Winkler, K.; Bass, L.; Keiding, S.; Tygstrup, N. (Kommunehospitalet, Copenhagen, Denmark). *Ann. Gastroenterol. Hepatol.* 11(6):427-434; 1975.

7132 VALUE OF SONOGRAPHIC EXPLORATION OF THE GALLBLADDER. (Ger.) Ortmann, G.; Roth, M. (Chirurgische Klinik und Poliklinik, Medizinische Akademie Erfurt, Nordhaeuser Str. 74, E. Germany). *Dtsch. Gesundheitswes.* 31(23):1090-1091; 1976.

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7167 PROTECTIVE DIETARY FACTORS IN EXPERIMENTAL ULCERATION--STUDY OF SOME NIGERIAN CEREALS AND TUBERS. (Eng.) Elegbe, R. A.; Bamgbose, S. O. A. (Dept. Physiology and Pharmacology, Univ. Ibadan, Ibadan, Nigeria). *Postgrad. Med. J.* 52(607):258-263; 1976.

See also, 7081, 7083, 7168, 7172, 7176, 7177, 7180, 7182, 7184, 7186, 7194, 7206, 7213, 7215, 7221, 7224, 7239, 7245, 7260, 7264, 7266, 7276, 7278, 7283, 7286, 7289, 7293, 7294, 7296, 7306, 7319, 7329, 7347, 7372, 7374, 7383, 7388, 7394, 7421, 7422, 7440, 7441, 7442, 7447, 7453, 7457, 7459, 7460, 7461, 7462, 7472, 7476, 7477, 7552, 7582, 7592, 7607, 7671, 7672, 7679.

GASTROINTESTINAL DISEASES

ESOPHAGUS

7168 A SIMPLE OPEN-END-TUBE METHOD FOR THE STUDY OF OESOPHAGEAL MOTOR FUNCTIONS.

(Eng.) Ismail, A. A.; Shalaby, E. S.; Gaafar, M. A.; Hafez, S. I. (Dept. Medicine, Cairo Univ., Cairo, Egypt). *J. Egypt. Med. Assoc.* 57(1/2):1-8; 1974.

A simplified open-end tube apparatus for studying esophageal motor function was constructed. The apparatus consisted of three flexible rubber tubes (internal diameter, 1.5 mm) fastened together, with terminal openings 5 cm from each other, allowing simultaneous pressure registration. Three water manometers (length, 40 cm; internal diameter, 0.2 cm), each with a long tube and water reservoir, were connected to the esophageal tube at one end and to a mechanical recording system at the other. This system eliminates the need for an expensive transducer, without significantly lowering the accuracy of the method. It has a low sensitivity to rapid oscillations, which eliminates calibration errors, can be built easily, and does not expose the patient to radiation. This method may be useful as a confirmatory or diagnostic tool.

7169 AN UNCONTROLLED COMPARISON OF TREATMENTS FOR ACHALASIA.

(Eng.) Yon, J.; Christensen, J. (Univ. Iowa Hosps., Iowa City, IA 52242). *Ann. Surg.* 182(6):672-676; 1975.

The results of treatment were analyzed in 78 patients with achalasia who received one or more of five different treatment regimens. Six of the seven patients treated with anticholinergics (and occasionally with a tranquilizer) failed to improve; the one patient who improved was asymptomatic for 1 yr and was then lost to follow-up. Among 23 patients treated by dilatation with mercury-filled bougies (usually to a 60 French), 14 experienced some relief of symptoms, but in no case for longer than 4 months. Two patients suffered esophageal perforation, but both recovered with conservative treatment. Ten patients were instructed in periodic self-dilatation by the mercury-filled bougies; of the seven patients that were followed up, all experienced improvement for a few days to a few weeks following each dilatation. All patients who were followed up have required repeated dilatations or the use of a different mode of therapy to alleviate symptoms. Forty-eight patients were treated with pneumatic bag dilatation (usually inflated to 10-13 lb/in^2 for 2 min), and 43 were followed up. Of these, 19 became asymptomatic for a year or more following the initial dilatation. Two of the 19 patients subsequently developed a recurrence of symptoms. Eleven other patients became asymptomatic after pneumatic dilatation, but did not return for yearly follow-up (2 patients) or developed recurrent symptoms within a year (9 patients). Six of the 48 experienced some improvement after pneumatic bag dilatation, but nine were unchanged. No patient developed esophageal perforation after this procedure, but aspiration pneumonia occurred in two. Three patients developed gastroesophageal reflux 3 months to 6 yr after dilatation. Twenty-four patients were treated by esophagocardiomyotomy, 11 of whom had at least one previous pneumatic dilatation. Of the 20 patients followed for a year or more after operation, 17 were asymptomatic. Two of the 17 became symptomatic again 1.5 and 3 yr after the procedure. Three patients were moderately improved postoperatively. Five of the 20 patients followed up developed gastroesophageal reflux. It appears that the only treatments that are clearly beneficial to patients with achalasia are pneumatic dilatation and esophagocardiomyotomy.

7170 MORTALITY IN OESOPHAGEAL ATRESIA.

(Eng.) Cozzi, F.; Wilkinson, A. W. (Children's Hosp., Univ. Rome, Rome, Italy). *J. R. Coll. Surg. Edinb.* 20(4):236-243; 1975.

The mortality rates, treatment, and incidence of associated anomalies of esophageal atresia were compared in 60 neonates treated between 1967 and 1973 and in 93 other neonates treated between 1959 and 1967. The mortality rate during the first admission in the newer series was 28%, and that in the earlier series was 35%; the overall death rates were 33% and 43%, resp. Of 32 neonates with esophageal atresia combined with lower pouch fistula in the earlier series, a primary anastomosis was made in 13; 5 of these patients died. In the remaining 19 infants, the treatment was divided in stages in an effort to reduce the mortality. However, 14 of these patients died. In the more recent series, the operation was done in stages only if the gap between the two pouches was too wide for a primary anastomosis to be made. There were 52 patients with esophageal atresia combined with lower pouch fistula in the later series, and 14 underwent the operation divided into stages; 6 of these infants died. Three of the 52 patients died before an operation could be attempted, and the remaining 35 patients underwent primary anastomosis; 8 of them died. In nine patients with a wide gap between the pouches, attempts to lengthen the proximal pouch were made by stretching with a bougie. In five of these patients, the delayed anastomosis broke down, and a colon replacement was necessary. The incidence of severe associated anomalies in the group treated between 1967 and 1973 was 28%, while that in the earlier group was 32%. In the combined series, esophageal atresia was associated with an anorectal anomaly in 28; 14 of these patients had other associated anomalies, and 12 of them died. Twenty-seven patients with esophageal atresia also had severe anomalies of the heart and great vessels, and 23 of them died. The authors conclude that when a primary anastomosis is not feasible because of the wide gap between the pieces of esophagus, immediate cervical esophagostomy and gastrostomy, followed by bridging of the gap with a colon segment at 1 yr of age, is the treatment of choice.

7171 LONG-TERM RESULTS AFTER SURGERY FOR ESOPHAGEAL ATRESIA.

(Ger.) Koch, A.; Ellers, J.; Krtsch, H.; Siewert, R. (Klinik Allgemeinchirurgie, Univ. Gottingen, Gottingen, W. Germany). *Z. Kinderchir.* 18(1):33-44; 1976.

The results of long-term follow-up of successful surgery for neonatal esophageal atresia are reported. The sample consisted of 27 cases; the longest postoperative follow-up term was 23 yr, and the shortest was 16 yr. Three patients reported a frequency of upper respiratory tract infections of more than five times/yr. Occasionally painful deglutition in excess of four episodes/yr was admitted by eight of the patients; all others noticed a decrease in problems after age 7. The physical development of the subjects followed a normal age-compatible distribution curve, except for five girls and two boys below the 50th percentile in weight, of whom four were also below the 50th percentile in height. Thoracic asymmetry was present in 12 of the 27 patients. There was positive insulin stimulation in 21 cases, with a basal gastric acid secretion of 3 mEq/hr rising to 13 mEq/hr. Endoscopy revealed no esophageal stenosis; esophagitis or endobrachy esophagus in 1 of 23 patients was of no clinical importance. Radiologically there was prominent scoliosis in 2 cases, lower cervical and upper thoracic spinal anomalies in 2 cases, rib deformities in 22 cases, and pleural fixation in 4, but no lung parenchymal changes in any. One esophageal stenosis was found radiologically; a blind paraesophageal fistula secondary to anastomotic insufficiency 23 yr earlier. Slight indentations at the anastomosis level occurred in 21 cases, and the yo-yo phenomenon in 24. There was no hiatal hernia or esophageal reflux. Esophageal manometry found an average 9-cm long hypomotile segment, but primary peristalsis was present to some extent in all patients. The average lower esophageal sphincter pressure was 18.6 mm Hg in the patient group, compared to 19.4 mm Hg in the control group, indicating that the cardiac sphincter mechanism improves with aging.

7172 GASTRO-OESOPHAGEAL REFLUX DISEASE: CORRELATION OF SUBJECTIVE SYMPTOMS WITH 7 OBJECTIVE OESOPHAGEAL FUNCTION TESTS.

(Eng.) Krejs, G. J.; Seefeld, U.; Brandli, H. H.; Bron, B. A.; Caro, G.; Schmid, P.; Blum, A. L. (Dept. Medicine, Stadtspital Triemli, Birmensdorfer Str. 497, CH-8063, Zurich, Switzerland). *Acta Hepatogastroenterol. (Stuttg.)* 23(2):130-140; 1976.

Seven tests for the diagnosis of gastroesophageal reflux were administered to 24 healthy controls and to 48 patients with symptoms of reflux disease. The patients had no concurrent gastrointestinal disease, had not had gastric or duodenal ulcer within 5 yr, had no esophageal stenosis, and had no previous gastrointestinal surgery. The correlation coefficient between subjective symptoms and test results was best with acid clearance from the distal esophagus ($r=0.558$, $p<0.001$). Other tests in decreasing order of correlation were: suction biopsy 5 cm above the lower esophageal sphincter with evaluation of granulocytic infiltrates ($r=0.450$, $p<0.001$), radiologic demonstration of hiatal hernia ($r=0.435$, $p<0.001$), reflux provocation test ($r=0.359$, $p<0.01$), modified Bernstein test ($r=0.322$, $p<0.01$), acid reflux test ($r=0.252$, $p<0.05$), and resting pressure of the lower esophageal sphincter ($r=0.246$, $p<0.05$). The Maudsley Personality Inventory did not correlate with the subjective symptoms ($r=0.188$, $p>0.1$). Stepwise multiple regression analysis revealed that the most useful combination of tests was acid clearance + modified Bernstein test + histological examination of suction biopsies + radiology. Addition of any other test did not result in any further information. It is concluded that single tests cannot distinguish clearly between normal and abnormal reflux, but a combination of tests more nearly approaches this goal.

7173 FUNDOPLICATION FOR REFLUX ESOPHAGITIS: MISADVENTURES WITH THE OPERATION OF CHOICE.

(Eng.) Polk, H. C., Jr. (Dept. Surgery, Univ. Louisville Sch. Medicine, Health Sciences Center, Louisville, KY 40201). *Ann. Surg.* 183(6):645-652; 1976.

Complications associated with a series of 312 fundoplication operations performed for the control of reflux esophagitis are discussed. A transabdominal approach was employed in 220 cases, and 92 were approached through the thorax. Intractable esophagitis was the indication for surgery in 92%. At a mean follow-up of 3.8 yr, the failure rate was 4.1%, half due to primary anatomic recurrence of hernia and half to recurrence of reflux esophagitis. Incidental splenectomy was required in 7% because of unintentional injury to the spleen. Operative wound infection occurred irregularly and was more frequent among patients undergoing abdominal operations. The use of 2-0 silk rather than 3-0 silk for the sutures eliminated dehiscence of the fundoplication. The most frequent nuisance complication was transient dysphagia, typically appearing on the 10th postoperative day and disappearing by the 20th day. Each of the 58 patients who developed this problem responded immediately when a liquid diet was maintained for 2 weeks. Major problems were associated only with unintentional injury to the spleen, mobilization of an acutely inflamed esophagus, and other visceral injury. In none of four patients requiring excision of a fibrotic Schatzki ring was difficulty encountered when the excision was approached by high gastrotomy. Three patients died during hospitalization, one from fulminant gram-negative pneumonitis, one from uncontrolled sepsis, and one from a myocardial infarction. Six per cent of patients complained of symptoms consistent with the "gas bloat" syndrome; they disappeared within 3 months in all but one patient. Overall morbidity in the last 100 patients of the series declined from 14% to 5%, and no deaths have occurred in the last 158 persons undergoing fundoplication operations.

7174 ESOPHAGEAL FUNCTION IN PROGRESSIVE SYSTEMIC SCLEROSIS.

(Eng.) Krejs, G. J.; Lobsiger, M. M.; Rau, R.; Bron, B. A.; von Buren, U. S.; Peter, P.; Brandli, H. H.; Pirozynski, W.; Blum, A. L. (Dept. Medicine, Stadtspital Triemli, Birmensdorfer Str. 497. CH-8063 Zurich, Switzerland). *Acta Hepatogastroenterol. (Stuttg.)* 23(1):40-46; 1976.

Esophageal function was studied in 13 consecutive patients with systemic progressive sclerosis (PSS) by acid-clearance measurements in the distal esophagus, suction biopsy of the distal esophagus, three-point manometry, cineradiography, and provocation of gastroesophageal reflux. Esophageal symptoms were reported in eight patients: dysphagia (7), retrosternal burning (5), pharyngeal burning (5), pain or swallowing (2), and one case each of retrosternal pain, retrosternal tightness, and vomiting. Only one of four patients with PSS of less than 2 yr duration had esophageal symptoms, but they were present in seven of nine of those with the disease for more than 2 yr. Subjective symptoms could not be predicted clearly on the basis of test results. Absence of peristalsis, the retention of air, and dilatation were noted with cineradiography and three-point manometry. Relaxation of the lower esophageal sphincter (LES) was normal in seven of eight; in one, it could not be measured because of a resting pressure of 0. With normal primary peristalsis and normal LES resting pressure, acid clearance was normal or only slightly abnormal. Acid clearance became progressively more prolonged with more severe derangement of peristalsis or LES pressure, and when both were destroyed, acid clearance was impossible. Acid clearance could not differentiate between the pathology of the esophageal body and that of the LES. The muscularis mucosa or blood vessels obtained by suction biopsy did not show any changes diagnostic of PSS. Absence of peristalsis occurred as early as 1 yr after diagnosis of PSS and as late as 5 yr. Impairment of pressure was related linearly to duration of the disease ($p<0.05$). The reflux-provocation test directly demonstrated a pathological reflux in 9/13, but in only 4 of these was a pathological reflux also demonstrated by cineradiography, indicating the limited value of radiology here. It is concluded that extensive esophageal damage may be present in PSS in the absence of esophageal symptoms.

7175 PEPTIC ESOPHAGITIS AND TUMOR-CALCIFICATION IN THE ZOLLINGER-ELLISON SYNDROME. (Ger.) Rosenbusch, G.; Lamers, C.; van Tongeren, J. (Roentgendiagnostische Abt., Innere Klinik der Universitat Nijmegen, Sint Radboud Ziekenhuis, Netherlands). *Radiologe* 15(5):210-214; 1975.

The relation between acute stenosis in the distal esophagus and Zollinger-Ellison syndrome (ZES) is examined. The clinical sample consisted of 10 ZES patients with acute stenosis diagnosed from episodes of reflux esophagitis. One 26-yr-old man had been treated six times for recurrent gastric or duodenal ulcer, both surgically and conservatively. A gastric stenosis of the distal esophagus and two large infiltrating ulcers at the level of the Billroth II anastomosis were confirmed radiologically. The ZES diagnosis was also based on hypergastrinemia and greatly elevated gastric acid secretion (168 mEq/hr/12 hr). A total gastric and distal esophageal resection and esophagojejunostomy were performed. There was no peroperative or angiographic evidence of pancreatic tumor. The stenosis was iatrogenic, consequent to mechanical changes after multiple gastric operations. Calcification of a gastrin-secreting pancreatic islet tumor was found in a 34-yr-old man with a history of recurrent duodenal ulcers and concurrent hyperparathyroidism. After parathyroidectomy and removal of a renal pelvic stone, the plasma calcium and gastric problems were reduced for 9 yr. Subsequent radiology on renewal of gastric pain revealed a gastric ulcer and calcification in the pancreatic body. ZES was diagnosed on the basis of hyperacidity. Total gastric resection with excision of a large pancreatic tumor and nodal metastases were performed. Histology revealed a non-beta cell tumor with calcification in the parenchyma, hyaline connective tissue, and necrotic foci. Calcification in the tumor was sometimes luminal, surrounded by columnar cells. The serum gastrin was 1,495 pg/ml, 3 yr postgastrectomy. Changes of the stomach and the small intestine due to gastrin-producing tumors are important diagnostic signs for ZES. However, peptic esophagitis and calcification of the gastrin-producing pancreatic tumor are atypical for ZES.

7176 ARTERIAL VASOCONSTRICTOR THERAPY FOR BLEEDING OESOPHAGEAL VARICES. (Eng.) Palmer, F. J.; De Carle, D. J. (Prince Henry Hosp., Anzac Parade, Little Bay, N.S.W., 2036, Australia). *Med. J. Aust.* 1:143-146; 1976.

7177 THE PROGNOSTIC VALUE OF OESOPHAGEAL INVESTIGATIONS IN PATIENTS WITH SYMPTOMS OF GASTRO-OESOPHAGEAL REFLUX [Abstract]. (Eng.) Irvin, T. T.; Perez-Avila, C. (Royal Infirmary, Sheffield, England). *Gut* 17(5):396; 1976.

7178 GIANT CAVERNOUS HEMANGIOMA OF THE ESOPHAGUS. (Eng.) Feist, J. H.; Siconolfi, E. P.; Gilman, E. (Allegheny General Hosp., 320 E. North Ave., Pittsburgh, PA 15212). *JAMA* 235(11):1146-1147; 1976.

7179 CHONDROSARCOMA OF THE ESOPHAGUS. (Eng.) Yaghmai, I.; Ghahremani, G. G. (Virginia Commonwealth Univ.-Medical Coll. Virginia, Richmond, VA 23298). *Am. J. Roentgenol.* 126(6):1175-1177; 1976.

7180 BARRETT'S ESOPHAGUS: A MULTIFACETED CONDITION. (Eng.) Burke, E. L.; Mullen, J. T. (Box 606, Naval Hosp., Portsmouth, VA 23708). *South. Med. J.* 69(3):331-333; 1976.

7181 A COMBINED SURGICAL APPROACH IN THE MANAGEMENT OF ACHALASIA OF THE ESOPHAGUS. (Eng.) Mansour, K. A.; Symbas, P. N.; Jones, E. L.; Hatcher, C. R. (Emory Univ. Clinic, Atlanta, GA 30322). *Am. Surg.* 42(3):192-195; 1976.

7182 THE RELATIVE APPLICATION OF ENDOSCOPY AND OTHER DIAGNOSTIC METHODS IN ACHALASIA. (Eng.) Rinaldo, Jr., J. A.; Biederman, M. A.; Gelzayd, E. (Providence Hosp., 16001 West Nine Mile Road, Southfield, MI 48075). *Gastrointest. Endosc.* 22(3):145-147; 1976.

7183 ESOPHAGEAL DILATATION USING THE EDER PUESTOW DILATORS. (Eng.) Royston, C. M. S.; Dowling, B. L.; Gear, M. W. L. (Hammersmith Hosp., DuCane Road, London, W12 OHS, England). *Am. J. Surg.* 131(6):697-700; 1976.

7184 RADIOLOGICAL ASPECTS OF LOWER ESOPHAGEAL RINGS IN ADULTS. (Fre.) Lafaye, M.; Jarlot, D.; Tournier, C.; Fermaud, H.; Bruneaud, D.

(Hopital Saint-Jacques, place Henri-Dunant, 63000 Clermont-Ferrand, France). *J. Radiol. Electrol. Med. Nucl.* 56(12):855-859; 1975.

7185 RESPIRATORY INVERSION POINT. HYPOTHESIS ON ITS GENESIS. (Spa.) Molina, R.; Benages, A.; Ridocci, M. T.; Mora, F.; Cosin, J. A. (Hospital Clinoco Universitario de Valencia, Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(3):309-316; 1976.

See also, 7074, 7127, 7128, 7149, 7197, 7214, 7224, 7273.

STOMACH

7186 SCANNING ELECTRON MICROSCOPY OF GASTROSCOPIC BIOPSIES. (Eng.) Fallah, E.; Schuman, B. M.; Watson, J. H. L.; Goodwin, J. (Div. Gastroenterology, Henry Ford Hosp., Detroit, MI). *Gastrointest. Endosc.* 22(3):137-144; 1976.

Specimens obtained from the gastric mucosa of four patients with normal stomachs, three with erosive gastritis, and three with chronic nonspecific gastritis were compared by scanning electron microscopy (SEM), to gain information on mucosal alterations to injury. The biopsy specimens were fixed immediately, without pretreatment, and were subjected to critical point drying. In the normal stomach, the openings to the gastric pits were round or oval and were located relatively uniformly over the surface (1 pit/ 3,500 μ^2). In erosive gastritis, the pits were increased in number (1/2,300 μ^2), and in chronic nonspecific gastritis, they were decreased (1/23,000 μ^2). The ostia of the gastric pits in the latter condition were huge and varied in shape. In the normal mucosa, the cells gave a cobblestone appearance, and micropits were dispersed over the surface. A cobbletone appearance was more prominent in erosive gastritis, and the cells contained few, if any, micropits. The epithelial cells of the normal stomach were found to contain unique bulb-like structures that were concentrated toward the margins of the cells. These projections were connected laterally by short necks, which ran parallel to the cell surface in different directions. In erosive gastritis, the bulbous projections were smaller in diameter and somewhat sparser; they were distributed evenly over the cell surfaces, rather than concentrating at the margins. The connecting necks were smaller than in the normal stomach. In nonspecific gastritis, the bulbous projections resembled true microvilli and were evenly distributed over the cell surfaces. The method of specimen preparation plus the higher resolution of the SEM may account for the first known observation of the bulb-like projections in this study. It is postulated that in the normal stomach the interconnecting necks form a web of knotted strands that contributes to mucosal resistance.

7187 THE ROLE OF BETA-ADRENERGIC STIMULATION IN HUMAN GASTRIC SECRETION. (Ger.) Mertz, D. P.; Papavassiliov, K. (Kurklinik am Park, Postfach 2340, 4934 Horn-Bad Meinberg 2, W. Germany). *Med. Klin.* 71(23):987-991; 1976.

The effect of two beta-receptor stimuli on acid and electrolyte secretion in the stimulated and nonstimulated human stomach is analyzed. Oxyfedrin (OX) was administered at a dose of 8 mg, i.v., to nine women and five men, all of whom were between 21-50 yr of age and five of whom had either chronic gastritis or duodenitis. Isoproterenol (IS) was given twice at doses of 1 mg or 2.5 mg, i.m., at 15-min intervals to two women (20-39 yr of age) and six men (23-44 yr of age), two of whom had chronic gastritis and duodenal ulcer. Gastric stimulation after secretory baseline determination was induced by 1.2 μg/kg pentagastrin (PG) in i.v. infusion for various 15-min periods. OX had no effect on volume rate or concentration and secretion rate of hydrogen ions (H), chloride ions (Cl), sodium ions (Na), potassium ions, calcium ions, or magnesium ions (Mg) without PG. With PG, the increases were in volume rate from 1.33 to 3.17 ml/min, H secretion from 44 to 107 mEq/l, H secretion rate from 56 to 336 mEq/min, Cl secretion from 95 to 136 mEq/l, and Cl secretion rate from 123 to 429 μEq/min. Sodium secretion, but not secretion rate, declined from 44 to 18 mEq/l. The modifications were significant at p=0.001, except for Na at p= 0.05. Ca also decreased after PG, from 1.3 to 0.3 mEq/l. With OX administered during maximal PG stimulation, the Mg secretory rate and secretion fell from 2.4 to 0.2 μEq/min (p=0.001) and from 0.79 to 0.07 mEq/l (p=0.05). H secretion and Cl secretory rate rose, resp., from 82 to 99 mEq/l (p=0.05) and 354 to 499 μEq/min (p=0.05), while Na secretion fell from 30 to 19 mEq/l (p=0.05). IS had no effect on basal or maximal PG stimulation. Only after PG challenge was the H and Cl excretion raised, resp., from 29 to 76 and from 76 to 117 mEq/l (p= 0.01). Since IS is without effect on gastric juice formation, the beta-receptor stimulation by OX is not responsible for the potentiation of H-ion secretion during increases in its concentration.

7188 GASTRIC XANTHOMA. (Eng.) Mast, A.; Elewaut, A.; Mortier, G.; Quatacker, J.; Defloor, E.; Roels, H.; Barbier, F. (Akademisch Ziekenhuis, De Pintelaan 135, B-9000 Ghent, Belgium). *Am. J. Gastroenterol.* 65(4):311-317; 1976.

Seven cases of gastric xanthoma (GX) are presented. Gastroscopy was performed, and serum lipid levels were determined in each patient; in one, a biopsy specimen of the GX was examined by electron microscopy. The patients (6 men and 1 woman) ranged in age from 54 to 70 yr. The predominant presenting symptoms were epigastric pain and, in some cases, weight loss. In patient 1, gastroscopy revealed a small hiatal hernia and four GX were seen on the vertical part of the lesser curvature, 1-5 mm in size. An ulcer of the vertical part of the lesser curvature was detected in patient 2, 1 yr prior to the detection of four GX on the larger curvature of the antrum; the GX ranged from 1 mm to 1 cm in size. Patient 3 had undergone Billroth II gastrectomy 18 yr prior to the detection of several GX in the gastric remnant and in the mucosal folds of the efferent loop. Signs of stomatitis and abundant bile reflux were noted. An ulcer of the lesser curvature was observed in patient 4; 6 weeks later, the ulcer was not observed, but a 1-cm wide, slightly elevated GX was seen on the anterior wall of the corpus. A small hiatal hernia was also seen. Patient 5 was found to have a prepyloric ulcer on the lesser curvature; 6 weeks later, the ulcer had healed, but a GX (5 mm in diameter) was found in the same area. Six GX, abundant bile reflux, gastritis, and intestinal metaplasia were found postoperatively following a Billroth II gastrectomy in the sixth patient. The seventh patient had a 4-mm wide GX on the larger curvature. Histologically, clusters of foam cells were seen in the lamina propria in all cases. Intestinal metaplasia occurred in all patients and gastritis in six patients. In patient 3, groups of foam cells in the jejunal GX were also seen in the submucosa. In patient 7, electron microscopy revealed irregular nuclei, well-deveoped Golgi apparatus, dilated rough endoplasmic reticulum saccules, and electron-dense cytoplasm containing fibrils. There were three types of vacuoles in the phagocyte cytoplasm: clear, osmiophilic, and those containing reticulated material. In patients 1 and 7, repeat endoscopy after 6 and 2 months, resp., showed that GX had disappeared. In patient 2, the GX had decreased in size after 6 months. In patient 3, the lesion was unchanged after 3 months. Slight hypertriglyceridemia (194-234 mg/100 ml) occurred in four patients; however, there was no correlation between GX and hypercholesterolemia.

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STOMACH

Peptic Ulcers

7233 A CELLULAR-BIOCHEMICAL EVALUATION OF GASTRIC BODY MUCOSA AND MUSCULAR LAYER IN PATIENTS WITH DIFFERENT BASAL ACID OUTPUTS. (Eng.) Mozsik, G.; Vizi, F.; Kutas, J. (Univ. Medical Sch., H-7643 PECS, Hungary). *Scand. J. Gastroenterol.* 11(2):205-211; 1976.

The gastric corpus mucosa and muscular layer of patients with decreased, normal, and increased basal acid output (BAO) levels (<2.0 mEq/hr, 2.0-4.0 mEq/hr, and >4.0 mEq/hr, resp.) were analyzed biochemically. As the BAO increased, the levels of NA$^+$-K$^+$-dependent ATPase activity, tissue adenine-adenosine, AMP, ADP, ATP, phospholipid phosphates, and RNA all increased significantly in the gastric corpus mucosa. No significant changes in these parameters occurred in the gastric body muscular layer of any of the patients. It is concluded that the energy required for acid secretion is derived from the transformation of ATP into ADP and that the biochemical nature of the cells of the human gastric mucosa, but not in the muscular layer, is altered by changes in BAO.

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7253 OCCURENCE OF PEPTIC ULCER DISEASE IN COPENHAGEN MALES AGE 40-59. (Eng.) Jorgensen, T. G.; Gyntelberg, F. (Bispebjerg Hosp., Copenhagen, Denmark 2400 NV). *Dan. Med. Bull.* 23(1):23-28; 1976.

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7257 SLEEP ACID SECRETORY DEFECT IN DUODENAL ULCER [Abstract]. (Eng.) Hall, W. H.; Orr, W. C.; Stahl, M. (Veterans Admin. Hosp., Oklahoma City, OK). *Clin. Res.* 23(4):480A; 1975.

7258 PROGRESS REPORT. ASPIRIN IN CHRONIC GASTRIC ULCER: AN AUSTRALIAN EXPERIENCE. (Eng.) Duggan, J. M. (Royal Newcastle Hosp., Newcastle, N.S.W. 2300, Australia). *Gut* 17(5):378-384; 1976.

7259 THE PROBABILITY OF DEVELOPING SECONDARY ULCER IN PATIENTS HAVING A SOLITARY GASTRIC AND DUODENAL ULCER [Abstract]. (Eng.) Bonnevie, O. (Gentofte Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 10(34):13; 1975.

7260 A COMPARATIVE STUDY OF TWO GEOGRAPHICALLY DIFFERENT GROUPS OF PATIENTS WITH GASTRIC ULCER, DUODENAL ULCER AND X-RAY NEGATIVE DYSPEPSIA IN REYKJAVIK AND COPENHAGEN [Abstract]. (Eng.) Jonasson, T. A.; Binder, V.; Thorgeirsson, T.; Oddsson, E.; Gunnlaugsson, O.; Wulff, M.; Jonasson, K.; Wulff, H. R.; Bjarnason, O.; Riis, P. (St. Josefsspitalinn, Univ. Iceland, Reykjavik, Iceland). *Scand. J. Gastroenterol.* 10(34):13-14; 1975.

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7262 MASSIVE HAEMORRHAGE FROM GASTRODUODENAL ULCER. A SERIES OF 149 CASES OPERATED ON. (Eng.) Inberg, M. V.; Linna, M. I. (Dept. Surgery, Univ. Turku, Turku, Finland). *Acta Chir. Scand.* 141(7):664-669; 1975.

See also, 7099, 7127, 7157, 7167, 7191, 7192, 7226, 7229, 7275, 7285, 7398.

SMALL INTESTINE

7263 GROWTH AND FAT ABSORPTION AFTER RESECTION OF ILEUM IN CHILDHOOD. (Eng.) Valman, H. B. (Northwick Park Hosp. Clinical Res. Center, Harrow, Middlesex, England). *J. Pediatr.* 88(1):41-45; 1976.

An assessment of height and weight of 12 children who survived resection of over 45 cm of ileum 3-16 yr previously was made and compared with siblings and parents. One year after the resection, all 12 patients were able to take a normal diet without consequent diarrhea. The weights of the children were found to be appropriate for their heights. Subcutaneous fat thickness percentiles were similar to weight percentiles in all patients. The patients tended to be shorter than their siblings, but only two children were below the third percentile, compared with parental heights. Vitamin B_{12}

absorption ranged between 0 and 77%, confirming the marked impairment of ileal function in the majority of these patients. Fat excretion was not decreased by p.o. antibiotics in the two patients tested (9.1-9.3 g/day and 14.1-14.6 g/day). The serum levels of vitamins A, D, and E were normal, although steatorrhea (without diarrhea) was still present in the older children. The results suggest that some children may tolerate a normal diet and grow well despite persisting defects in absorption following extensive ileal resection.

7264 CONTROL OF DUODENAL HAEMORRHAGE WITH CYANOACRYLATE. (Eng.) Goldin, A. R. (Groote Shuur Hosp., Observatory 7925, Cape Town, South Africa). *Br. J. Radiol.* 49(583):583-588; 1976.

The cases of three patients in whom massive duodenal bleeding was successfully treated by the selective intra-arterial injection of Isobutyl 2 cyanoacrylate are presented. The first patient, a 53-yr-old man who had undergone left nephrectomy for renal carcinoma with irresectable aortic nodes, developed massive bleeding from an acute ulcer of the second part of the duodenum. The bleeding persisted despite vagotomy, pyloroplasty, gastrostomy, Polya's operation, and pitressin infusion. Cyanoacrylate ($0.2\ cm^3$) was injected into the posterior superior pancreatoduodenal artery via a coaxial catheter passed through a Cordis catheter. This completely occluded the gastroduodenal artery and glued the coaxial catheter to the vessel occluding the catheter lumen. Following removal of the coaxial catheter, celiac arteriography demonstrated complete occlusion of the gastroduodenal artery with no extravasation. Repeat inferior pancreatoduodenal arteriography demonstrated persisting extravasation, and cyanoacrylate ($0.2\ cm^3$) was injected to occlude this vessel; the extravasation was controlled, and the anterior superior pancreatoduodenal artery was filled via collaterals. During a 9-month follow-up, there were no further episodes of gastrointestinal bleeding. The second patient, a 70-yr-old woman, experienced melena on the 12th day following an anterior resection for rectosigmoid carcinoma. An acute duodenal ulcer was found, and the bleeding persisted despite pitressin infusion. The bleeding was controlled by cyanoacrylate (two divided doses of $0.1\ cm^3$, sandwiched between saline) into the gastroduodenal artery. No bleeding occurred during a 4-month follow-up. The third patient was a 42-yr-old woman with bleeding from a 6 x 4-cm aneurysm arising from the gastroduodenal artery. The injection of a chopped gelatin sponge failed to cause thrombosis of the aneurysm. The injection of cyanoacrylate in divided doses caused complete occlusion of the gastroduodenal and right hepatic arteries, with cessation of extravasation from the aneurysm. The patient remained well during a 3-month follow-up period, and repeat arteriography demonstrated proximal extension of the hepatic occlusion with no evidence of aneurysmal filling. The only complication encountered in any patient was transient epigastric pain. The results indicate that cyanoacrylate may be a valuable tool in intervention radiology.

7265 PRIMARY SMALL BOWEL PLASMACYTOMA WITH INTRACELLULAR FIBRILS. (Eng.) Harper, T. B., III.; Powers, J. M.; Russell, H. E.; Dunn, W. B., III, Gardner, W. A., Jr. (Charleston Veterans Admin. Hosp., 109 Bee St., Charleston, SC 29403). *Am. J. Gastroenterol.* 64(3):200-206; 1975.

The case of a 47-yr-old man with a rare plasma cell tumor, an extramedullary plasmacytoma arising in the small bowel, is presented. The patient presented with a 15-month history of nausea, postprandial vomiting, right upper quadrant pain, and weight loss. A tumor (located 20 cm distal to the ligament of Treitz), 20 cm of the surrounding bowel, and grossly enlarged mesenteric lymph nodes were removed at surggery. The patient remained asymptomatic until 1 yr later, when classical signs of multiple myeloma appeared. A subsequent laparotomy revealed tumor masses throughout the mesentery and omentum, producing fixation of the bowel to the anterior abdominal wall. The diagnosis of plasmacytoma was established by the microscopic finding of a neoplastic plasma cell infiltrate extending through the bowel wall from mucosa to serosa in the first surgical specimen. The tissue obtained at the second operation was similar to the initial tumor, although many of the plasma cells were more anaplastic with large nuclei, often binucleated, and had prominent nucleoli. Many of the cells contained paranuclear bundles of flexible and parallel fibrils that were 90 A in average diameter. Branches of the V or Y type were occasionally noted. This case is noteworthy because of the rarity and unusual course of the tumor and because of the presence of intracellular fibrils.

7266 CHANGES IN PLASMA NEPHELOMETRY AFTER ORAL FAT LOADING IN CHILDREN WITH NORMAL AND ABNORMAL SMALL INTESTINAL MORPHOLOGY. (Eng.) Robards, M. F. (Queen Elizabeth Hosp. Children, London, England). *Arch. Dis. Child.* 50(8):631-636; 1975.

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7268 INTESTINAL ABSORPTION FOLLOWING SMALL-BOWEL RESECTION. (Eng.) Perry, M. (St. Bartholomew's Hosp., London, England). *Ann. R. Coll. Surg. Engl.* 57(3):139-147; 1975.

7269 A COAGULATION DISORDER DURING REANASTOMOSIS OF SMALL-INTESTINAL BYPASS. (Eng.) Vaughan, R. W.; Wise, L. (Washington Univ. Sch. Medicine, 660 South Euclid Ave., St. Louis, MO 63110). *Anesthesiology* 43(3):360-363; 1975.

7270 MORPHOMETRIC STUDIES OF THE SMALL INTESTINE FOLLOWING JEJUNO-ILEAL SHUNT OPERATION. (Eng.) Solhaug, J. H. (Dept. Surgery, Univ. Bergen, Haukeland sykehus, Bergen, Norway). *Scand. J. Gastroenterol.* 11(2):155-160; 1976.

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7278 ENDOSCOPIC DIAGNOSIS OF MALIGNANT MELANOMA METASTATIC TO THE DUODENUM. (Eng.) Sivak, M. V., Jr.; Sullivan, B. H., Jr. (Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, OH 44106). *Gastrointest. Endosc.* 22(1):36-38; 1975.

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7280 ROTAVIRUS ENTERITIS IN THE WEST MIDLANDS DURING 1974. (Eng.) Bryden, A. S.; Hadley, R. E.; Davies, H. A.; Flewett, T. H.; Morris, C. A.; Oliver, P. (East Birmingham Hosp., Bordesley Green East, Birmingham B9 5ST, England). *Lancet* 2(7928):241-243; 1975.

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7282 GASTRO-INTESTINAL GANGLIONEUROMATOSIS: A CASE OF ILEUS OWING TO GANGLIONEUROMATOSIS. (Eng.) Reintoft, I. (Svendborg Hosp., 5700 Svendborg, Sweden). *Dan. Med. Bull.* 22(5):214-216; 1975.

7283 POST-EVACUATION FINDINGS IN BARIUM ENEMA TREATED INTUSSUSCEPTIONS. (Eng.) Eklof, O.; Hugosson, C. (Dept. Pediatric Radiology, Karolin-Sjukhuset, S-104 01 Stockholm 60, Sweden). *Stockh. Radiol. (Paris)* 19(1):133-139; 1976.

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7285 DUODENAL OBSTRUCTION DUE TO ABDOMINAL AORTIC ANEURYSM. (Eng.) Adair, H. M. (Mayday Hosp., Mayday Road, Thornton Heath, Surrey, CR4 7YE, England). *Br. Med. J.* 2(5973):727; 1975.

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7288 ACUTE TUBERCULOUS PERFORATION OF THE SMALL INTESTINE. (Eng.) Prakash, A.; Rao, I. R. (All India Inst. Medical Sciences, New Delhi-16, India). *Int. Surg.* 60(8):397-398; 1975.

7289 FLUID-FILLED INTESTINAL OBSTRUCTION. (Eng.) Kingsnorth, A. N. (Brook General Hosp., London, England). *Br. J. Surg.* 63(4):289-291; 1976.

7290 STAGNANT LOOP SYNDROME WITH EVIDENCE OF BILE SALT DECONJUGATION IN A CHILD. (Eng.) Kilby, A. (Queen Elizabeth Hosp. Children, Hackney Road, London E2 8PS, England). *Proc. R. Soc. Med.* 68(7):417-418; 1975.

7291 A 66-YEAR-OLD MAN WITH AN ULCERATED LESION OF THE ILEUM. (Eng.) Ottinger, L. W.; Vickery, A. L., Jr. (No affiliation given). *N. Engl. J. Med.* 294(21):1171-1175; 1976.

7292 VASCULAR COMPRESSION OF THE DUODENUM: PRESENTATION OF TEN CASES AND REVIEW OF THE LITERATURE. (Eng.) Akin, J. T., Jr.; Gray, S. W.; Skandalakis, J. E. (Piedmont Hosp., Atlanta, GA). *Surgery* 79(5):515-522; 1976.

See also, 7100, 7101, 7104, 7105, 7108, 7122, 7153, 7155, 7192, 7200, 7201, 7204, 7294, 7303, 7326, 7328, 7339, 7367, 7390, 7399, 7603, 7611, 7612, 7616, 7632, 7637, 7640, 7652, 7659, 7667.

SMALL INTESTINE

Malabsorption

7293 THE VALUE OF TREHALASE ACTIVITY DETERMINATION RELATIVE TO PEDIATRIC INTESTINAL RESORPTION POTENTIAL. (Ger.) Fiehring, C.; Koslowski, H.; Jung, G.; Wedekind, U. (Kinderklinik, Medizinische Akademie, 50 Erfurt, Am Schwemmbach 32a, E. Germany). *Dtsch. Gesundheitsw.* 31(23):1091-1095; 1976.

Trehalase and other disaccharidase activity in normal and diseased intestinal mucosa was assayed. In 10 healthy children receiving 2 g/kg trehalose (TH) loading, the blood glucose increase was normal in 5 and negative in 5; 8 responded positively to lactose (LT) and 10 to maltose (MT) and saccharose (SH) loading, at 2 g/kg. In 17 children with malabsorption syndrome (MS), the result of MT, SH, and LT loading was normal, resp., in 10, 8, and 6 cases; TH was normal in only 7 of 17 patients. Jejunal samples (excised at the level of the ligament of Treitz) showed normal MT and SH, but no TH or LT activity in healthy children. No TH was found in the jejunal mucosa of 13 of 17 MS children; the remainder had high levels of 30-40 U/g wet weight. Comparison of TH loading and TH in jejunal biopsy was made in 16 children; there was no correlation in 8. In the other 8 children, a correlation between load and activity was positive in five, while a negative load result corresponded with deficient TH in three children. No significant difference in TH pattern of normal and MS bowel could be established. The independent determination of TH as an index of resorption in MS is meaningless.

7294 RADIOLOGICAL AND HISTOLOGICAL FINDINGS IN SIX PATIENTS WITH ALPHA-CHAIN DISEASE. (Eng.) Doe, W. F.; Henry, K.; Doyle, F. H. (Scripps Clinic and Res. Foundation, La Jolla, CA). *Br. J. Radiol.* 49(577):3-11; 1976.

The radiological and histological features of α-chain disease in six men (age, 18-36 yr) are described. The symptoms, present for 6 months to 6 year, included weight loss, diarrhea, abdominal pain (5 patients), wasting (4), gross finger clubbing (4), ankle edema (3), and elevated serum levels of alkaline phosphatase (5). On barium enema examination, all patients showed multiple fluid levels on erect films taken during the course of their follow-up examinations. In general, the abnormalities were more severe in the proximal and mid-small bowel than in the distal small bowel. Circular folds were thickened to a minor extent in five patients and grossly thickened in the duodenum and proximal jejunum in one. A nodular mucosal pattern was a striking feature in one, prominent in two, and present to a minor degree in two patients. Nodularity of the mucosal pattern was accompanied by a combination of scalloped and spiky contour in three patients. All patients showed some evidence of segmental dilatation that was not constant with time. Histological findings showed partial villous atrophy in one patient and subtotal villous atrophy in five, moderate numbers of crypts in one and sparse crypts in five, prominent diffuse plasma cell infiltration in one and massive diffuse infiltration in five, and low to normal luminal epithelium in all six patients. The histological and radiological assessment of the severity of the disease was similar in all but one case. α-Chain disease should be suspected in young men presenting with weight loss, diarrhea, abdominal pain, finger clubbing, and elevated serum alkaline phosphatase levels, especially in those geographical areas known to have a high incidence of intestinal infections.

7295 GASTROINTESTINAL BLEEDING AND IRON ABSORPTION IN THE EXPERIMENTAL BLIND LOOP SYNDROME. (Eng.) Giannella, R. A.; Toskes, P. P. (Veterans Admin. Hosp., Cooper Drive Div., Lexington, KY 40506). *Am. J. Clin. Nutr.* 29(7):754-757; 1976.

Gastrointestinal bleeding, vitamin B_{12} absorption, bacterial flora, and iron absorption were studied in the experimental blind loop syndrome. Ten-centimeter self-filling jejunal blind loops were constructed 10 cm distal to the ligament of Treitz in experimental male albino rats. Normal rats and rats in which self-emptying loops of the same size had been constructed at the same location served as controls. After a 5-ng orogastric dose of ^{57}CO-cyanocobalamin, normal rats absorbed a mean 64.2 ± 3.1%, rats with self-emptying loops, 62.8 ± 2.4%, and rats with self-filling loops only, 25.1 ± 4.2% of the dose. In rats with self-filling blind loops, the concentration of total aerobes and anaerobes was significantly increased in both the blind loop segment (BL; 8.3 ± 0.4 aerobes, 9.5 ± 0.2 anaerobes) and in the intestine distal to the blind loop (EJ; 8.1 ± 0.4 aerobes, 9.5 ± 0.3 anaerobes) compared to comparable intestinal segments from normal rats (BL, 7.2 ± 0.2 aerobes, 7.8 ± 0.2 anaerobes; EJ, 7.4 ± 0.3 aerobes, 7.0 ± 0.3 anaerobes) and from rats with self-emptying loops (BL, 6.9 ± 0.3 aerobes, 8.0 ± 0.2 anaerobes; EJ, 7.2 ± 0.3 aerobes, 7.7 ± 0.3 anaerobes. After an orogastric dose of 0.25 Ci ^{59}FeCl$_3$ and 0.25 mg of FeCl$_3$, rats with self-filling loops absorbed significantly more iron (15.2 ± 1.8%) than did normal rats (4.5 ± 0.69%). Only 1 of 20 normal rats and 0 of 6 rats with self-emptying loops had guaiac-positive stools, while 18 of 21 rats with self-filling loops had fecal blood loss. It is suggested that the documented gastrointestinal bleeding in rats with the experimental blind loop syndrome is another manifestation of damage to the intestinal epithelium in conditions of small intestinal bacterial overgrowth.

7296 THE ROLE OF SMALL BOWEL FOLLOW-THROUGH EXAMINATION IN THE DIAGNOSIS OF COELIAC DISEASE.

(Eng.) Masterson, J. B.; Sweeney, E. C. (Bristol Royal Infirmary, Bristol, England). *Br. J. Radiol.* 49(584):660-664; 1976.

The value of the barium follow-through examination in the diagnosis of celiac disease, jejunal biopsy histology, and clinical data were compared in 34 studies of 31 patients with proven celiac disease. Two of the patients had normal x-ray appearances, but jejunal histology showed partial villous atrophy. Two patients had abnormal x-ray appearances, but jejunal histology was normal. In 30 examinations, both x-ray and biopsy findings were abnormal. Seventeen of 25 patients (68%) showed steatorrhea, and 26 of 31 (83.7%) patients given d-xylose excretion tests showed decreased urinary excretion. The most common abnormal radiological signs were dilation of the bowel lumen (88%), thickened mucosal folds (88%), thickened duodenal folds (72%), segmentation/flocculation (65%), and sparse duodenal folds (50%). There were also assymmetrical duodenal folds in 45%, dilation of the duodenum in 36%, transient intussusception in 15%, prolonged transit time in 9%, and moulage in 3%. Abnormal small bowel follow-through examination due to diseases other than celiac disease was diagnosed in a group of 19 patients. The diagnoses were atrophic gastritis with small bowel bacterial contamination in five patients, diabetic enteropathy in five, gastric surgery with small bowel bacterial contamination in three, lymphoma of the small bowel in two, and Crohn's disease, tropical sprue, Whipple's disease, and chronic pancreatitis in one patient each. It is concluded that barium follow-through examination, despite its nonspecificity, is highly sensitive in detecting small bowel abnormalities in celiac disease, and has potential for revealing alternate causes of malabsorption. It may be performed on an out-patient basis, and is simple, inexpensive, and noninvasive.

7297 HL-A HISTOCOMPATIBILITY ANTIGENS IN PEDIATRIC CELIAC DISEASE.

(Ger.) Rotthauwe, H. W.; Rittner, Ch.; Waiyawuth, V.; Becker, M.; Tauberecht, I. (Universitats-Kinderklinik, 5300 Bonn, Adenauerallee 119, W. Germany). *Dtsch. Med. Wochenschr.* 101(22):849-854; 1976.

HL-A typing in celiac patients, their parents, and siblings is reported. The clinical sample consisted of 22 girls and 19 boys, 1-15 yr of age. Celiac disease (CD) was confirmed histologically by villous atrophy in the florid state or after gluten loading. There were 70 parents and 30 siblings from 40 families; 320 unaffected persons served as the control group. Five antigens in the CD group were significantly different from the control values. In locus SD-1, HL-A1 had a gene frequency (GF) of 0.3766 in 61% of CD compared to a GF of 0.1624 in 30% of the controls ($p<0.0005$); HL-A9 had a GF of 0.0362 in 7.3% of CD compared to 0.1148 in 23% of the controls ($p=0.02$). In locus SD-2, HL-A7 had a GF of 0.0362 in 7.3% of CD compared to 0.1428 in 27% of the controls ($p=0.02$), HL-A8 had a GF of 0.3558 in 59% of CD relative to 0.0874 in 17% of the control group ($p<0.0005$), and HL-A12 had a GF of 0.2190 in 39% of CD compared to 0.1402 in 26% of the controls ($0.025<p<0.05$). Both HL-A1 and HL-A8 were concomitant in 22 of the 41 cases; the common linkage of HL-A8 and HL-A12 was also significant. No elevated frequencies of HL-A12 were found in 14 cases of adult CD. No parent or sibling was clinically CD. One healthy child in each of six families was haplotypically identical with the relevant patient. A comparison of HL-A1,8 with a control subject revealed significant increases in the pediatric CD ($p<0.0001$) and in their parents ($p=0.025$), but not in their siblings. For haplotypes HL-A3,7 and HL-A2,12, there was no difference from the controls. Ethnic and genetic facts and factors from the literature are reviewed and discussed.

7298 CELLULAR INFILTRATE OF THE JEJUNUM AFTER RE-INTRODUCTION OF DIETARY GLUTEN IN CHILDREN WITH TREATED COELIAC DISEASE.

(Eng.) Lancaster-Smith, M.; Packer, S.; Kumar, P. J.; Harries, J. T. (Hosp. Sick Children, Great Ormond St., London WC1, England). *J. Clin. Pathol.* 29(7):587-591; 1976.

Lamina propria cells and intraepithelial lymphocytes of 22 children (aged 0.5-5 yr; mean, 2 yr) with celiac disease were studied to clarify the pathogenesis of the small bowel lesion of childhood celiac disease and to see if this differs from that found in adults. Six subjects were on a gluten-containing diet; two had villous atrophy of the jejunal mucosa and the other four were normal. Of 16 subjects who had been on an alleged gluten-free diet, 13 had a normal initial biopsy. After these 16 subjects had been placed on a gluten-containing diet for 3 months, 10 subjects had a significant mucosal lesion, while

3 remained normal. The mean numbers of plasma cells, lymphocytes, or eosinophils did not differ significantly from controls. The mean number of plasma cells was raised in celiac patients on gluten-containing diets (5,536 cells/mm^2) in comparison with that in 10 controls (2,531 cells/mm^2, $p<0.002$). In celiac patients studied serially, there was a significant increase in plasma cells after 3 months on a gluten-containing diet ($p<0.002$). The mean number of lymphocytes in the lamina propria of celiac patients on gluten-containing diets (947 cells/mm^2) was increased in comparison with controls (1,382 cells/mm^2, $p<0.01$). In the celiac patients studied serially, there was a significant fall in the number of lymphocytes after 3 months on a gluten-containing diet ($p<0.01$). The mean number of lamina propria eosinophils in the celiac patients on the gluten-containing diet (797 cells/mm^2) was significantly increased compared with controls (320 cells/mm^2, $p<0.01$). The mean number of intraepithelial lymphocytes in the celiac patients on both the gluten-free diet (39 lymphocytes/100 epithelial cells) and the gluten-containing diet (59 lymphocytes/100 epithelial cells) was increased compared with controls (30/100 epithelial cells, $p<0.002$ and 0.05, resp.). In patients studied serially, there was a significant increase after 3 months on the gluten-containing diet ($p<0.002$). A possible explanation for the reduction in lamina propria lymphocytes after the reintroduction of dietary gluten is that under the antigenic stimulus of gluten, sensitized lymphocytes transform into plasma cells, which is seen in adult patients. An alternative reason may be increased migration of the lymphocytes into the epithelial cell layer. The results are similar to those made in the adult form of the disease and suggest that more than one type of immunological reaction is involved in the pathogenesis of the jejunal lesion.

7299 MUCOSAL RECOVERY IN TREATED CHILDHOOD CELIAC DISEASE (GLUTEN-SENSITIVE ENTEROPATHY).

(Eng.) McNicholl, B.; Egan-Mitchell, B.; Stevens, F.; Keane, R.; Baker, S.; McCarthy, C. F.; Fottrell, P. F. (Regional Hosp., Newcastle, Galway, Ireland). *J. Pediatr.* 89(3):418-424; 1976.

Follow-up studies on 36 children, in whom celiac disease was established by gluten challenge, were carried out after management on gluten-free diets for a mean of 6 yr. Twenty-five normal siblings of children with celiac disease served as controls. The body weight was of almost normal distribution, with 17 of 36 children at or above the 50th percentile, whereas at initial diagnosis, only 3 of 32 whose weights were recorded were above the 25th percentile. Height was also of almost normal distribution. Mucosal morphology was regarded as normal (grade 0) in 16 and showed minimal or slight changes (grade 1) in 20. The epithelial cell height in 36 children in remission did not differ from controls; cell height was significantly higher in grade 0 than in grade 1 cases. Cell height at the time of initial diagnosis and following a gluten challenge (during active celiac disease) was significantly lower. Although the counts of interepithelial lymphocytes in 30 patients were within the normal range, the mean count for all 36 (827/1,000 epithelial cells) was significantly higher than that for controls (258/1,000). The mean count in grade 1 celiac disease was significantly higher than that in controls in grade 0. There was no significant difference between the counts of lamina propria lymphoid cells in 35 subjects and controls. The mucosal lactase level in the control subjects in both the duodenum (27.6 IU/g/protein) and jejunum (62.8 IU/g/protein) was significantly higher than in the patients in remission (19.2 and 22.7 IU/g/protein, resp.) and after the gluten trial (4.76 and 7.21 IU/g/protein, resp.). Mucosal sucrase was significantly lower in the jejunum of the patients in remission (57.6 IU/g/protein) and after gluten trial (9.0 IU/g/protein) than in the jejunum of the controls (86.9 IU/g/protein). A low content of mucosal lactase and increased numbers of interepithelial lymphocytes may be sensitive indicators of persisting ingestion of gluten in mucosa that is otherwise normal, or almost so, in appearance.

7300 L-ALANYL-L-PROLINE DIPEPTIDASE AND GLYCYL-L-VALINE DIPEPTIDASE IN MALABSORPTION SYNDROME.

(Ger.) Fernekorn, A.; Fiehring, C. (Kinderklinik, Medizinischen Akademie, Erfurt, E. Germany). *Z. Gesamte Inn. Med.* 31(9):266-269; 1976.

Dipeptidase and disaccharidase intestinal activity was assayed in the pediatric malabsorption syndrome. The clinical sample consisted of 45 children of both sexes with celiac disease, carbohydrate disturbances, and pathology of unclear origin. About half had been managed for a long period. Mucous membranes were excised from the proximal jejunum (ligament of Treitz). The enzymatic-mucosal correlations were as follows: for normal mucosa, subtotal villous atrophy, and total villous atrophy, the median enzyme levels in U/g wet weight were 41.2, 27.0, 18.5, resp., for L-ala-L-pro-dipeptidase; 500.3, 441.9, 266.0, resp., for gly-L-val-dipeptidase; 4.5, 3.9, 0.5, resp., for lactase; 54.6, 33.0, 18.6, resp., for maltase; 15.2, 11.9, 6.6, resp., for saccharase; and 8.4, 7.3, and 6.7, resp., for trehalase. Discrepancies between these patterns and the literature data are discussed.

7301 COWS' MILK PROTEIN INTOLERANCE: A POSSIBLE ASSOCIATION WITH GASTROENTERITIS, LACTOSE INTOLERANCE, AND IgA DEFICIENCY.

(Eng.) Harrison, M.; Kilby, A.; Walker-Smith, J. A.; France, N. E.; Wood, C. B. S. (Queen Elizabeth Hosp. Children, Hackney Rd., London, E2 8PS, England). *Br. Med. J.* 1(6024):1501-1504; 1976.

Twenty-five children with cows' milk protein intolerance were studied to determine the possible role of gastroenteritis in the etiology of cows' milk intolerance and the relation between cows' milk intolerance and lactose intolerance. Twenty children presented with an acute gastroenteritis characterized by profuse diarrhea and vomiting. An enteropathogenic *Escherichia coli* was isolated from the stool at the time of the acute episode in two children and 5 weeks later in another. There was circumstantial evidence of infective diarrhea in six children. Five children presented with chronic diarrhea or vomiting and failure to thrive. The serum immunoglobulin A (IgA) levels were below normal in 8 of 20 patients tested. After rehydration with i.v. fluids or a p.o. glucose and electrolyte mixture, all 20 children who presented with acute gastroenteritis failed to tolerate cows' milk. Sixteen of these children developed 0.5-2% reducing substances in the stools, and paper chromatography confirmed lactose malabsorption in the 13 tested. Disaccharidase activities were depressed in three of seven children. After 2-9 months on a lactose-free diet, none of the 20 children developed diarrhea when given 7% lactose feeds. Within hours of a milk challenge, diarrhea with abnormal amounts of reducing substances occurred in all 20 children and in an additional three of the total studied. Loss of disaccharidase activity was observed in five children who underwent biopsy after challenge. A pronounced increase in mucosal damage was seen, and this was accompanied by a rise in the number of Ig-containing cells in the lamina propria. Of the nine children who underwent biopsy before milk withdrawal, none had a normal small intestinal mucosa; two had subtotal villous atrophy, and one had a patchy lesion of moderate to subtotal villous atrophy. After the milk challenge, diarrhea occurred in all 25, occult blood in stools in 22 of 23, weight loss in 22 of 25, temperature rise in 19 of 24, and increased eosinophil count in 16 of 25. The evidence suggests that an acute attack of gastroenteritis may act as a triggering mechanism in the pathogenesis of cows' milk intolerance and that an IgA deficiency may be a predisposing factor, in that it allows the patient to become sensitized to a foreign protein.

7302 CONGENITAL SACCHARASE-ISOMALTASE DEFICIENCY. A SIX YEAR SURVEY. (Ger.)

Lucking, T.; Burdelski, M. (Kinderklinik Medizinischen Hochschule, 3000 Hannover 61, Karl-Wiechert-Allee 9, W. Germany). *Dtsch. Med. Wochenschr.* 101(23):897-900; 1976.

Five cases of pediatric saccharase-isomaltase deficit (SID) are reported. There were three girls, 4.75-5 yr of age, and two boys, 6 and 7.5 yr of age. All presented with diarrhea and three with developmental retardation at ages 1-6 weeks; diagnostic ages were 6-22 months. Saccharose doses (2 g/kg) elicited no rise in blood sugar in any patient. Glucose doses (2 g/kg) induced normal blood glucose elevation, as did maltose (2 g/kg) in four cases and lactose (2 g/kg) in three cases. The saccharose and lactose tests were pathological in only one child; lactose incompatibility was found also with milk products. Jejunal stereomicroscopy and histology were normal in all cases. All patients showed a marked reduction in saccharase (SH), isomaltase (IM), and maltase (MT) activity but lactase levels were normal. The range of SH levels was 0.8-3.1 U/g protein relative to 101.4 U/g for controls. IM levels were 2.2-3.8 U/g compared to 102.3 U/g for controls, while MT was 36.2-75.1 U/g relative to a control mean of 346.7 U/g. One child received saccharose-free nutrition for more than 1 yr, with improved fecal response and weight normalization. The lactose-intolerant child also received saccharase-free and milk-free diets; the intolerance eventually disappeared. Four patients were given Bi-myconase, containing acid-stable SH and γ-amylase, which hydrolyzes saccharose and isomaltose intraluminally. With this medication, restrictive diets could be interrupted. After 2 yr of age, all children showed increasing tolerance of saccharose and special management was not required beyond 2.5-3.25 yr of age. Two children presently experience occasional diarrhea after a high intake of sweets, but the other three cases are symptom-free.

7303 THE ENDOSCOPIC APPEARANCE OF THE DUODENUM IN WHIPPLE'S DISEASE. (Eng.)

Volpicelli, N. A.; Salyer, W. R.; Milligan, F. D.; Bayless, T. M.; Yardley, J. H. (Lovelace-Bataan Medical Center, 5200 Gibson Blvd., S.E. Albuquerque, NM 87108). *Johns Hopkins Med. J.* 138(1):19-23; 1976.

The case of a patient in whom fiberoptic duodenoscopy provided an early clue to the presence of Whipple's disease is presented. The patient, a 45-yr-old alcoholic man, presented with progressive weight loss, diarrhea, and intermittent abdominal pain. Sigmoidoscopy showed an edematous mucosa with small, shallow ulcers, and a rectal biopsy demonstrated numerous PAS-positive, Alcian blue-negative, granule-containing macrophages and scattered PAS-positive extracellular rods in the lamina propria, submucosa, and muscularis. The upper gastrointestinal series showed thickened mucosal folds, without thickening of the bowel wall, from the duodenum to the ileum. A jejunal biopsy showed PAS-positive macrophages by light microscopy and inclusions and rod-shaped bacteria typical of Whipple's disease by electron microscopy. Duodenoscopy showed that the mucosa in the second portion of the duodenum appeared to be partially covered with a yellow-white material; this was found to consist of enlarged villi interspersed with normal-looking mucosa. Histologically, these enlarged white villi were shown to contain a heavy accumulation of lipid and typical PAS-positive macrophages. After 1 yr of therapy with various combinations of tetracycline, streptomycin, and chloramphenicol, the patient was clinically improved; the duodenal mucosa was endoscopically normal and showed only a few PAS-positive macrophages.

7304 ELEMENTAL DIET IN THE REHABILITATION OF GASTROINTESTINAL DISORDERS [Abstract].

(Eng.) Persson, B.; Lindblad, B. S. (No affiliation given). *Acta Paediatr. Scand.* 63(Suppl. 4):660; 1974.

7305 COMPARISON OF THE RESULTS OF SMALL-INTESTINAL BIOPSY AND CLINICAL SYMPTOMS IN CHILDREN WITH MALABSORPTION [Abstract]. (Eng.)

Bozkowa, K.; Misiurewicz, E.; Bardon, A.; Borowicz, K.; Grodzka, Z.; Sendecka, E. (No affiliation given). *Acta Paediatr. Scand.* 63(Suppl. 4):658; 1974.

SMALL INTESTINE

7306 USEFULNESS OF THE XYLOSE TEST FOR COELIAC DISEASE [Letter to Editor]. (Eng.) Ose, L.; Fluge, G. (5016 Haukeland Sykehus, Univ. Bergen, Norway). *Arch. Dis. Child.* 51(5):400-401; 1976.

7307 SHORT ONSET COELIAC DISEASE [Abstract]. (Eng.) McNicholl, B.; Egan-Mitchell, B.; Fottrell, P. (No affiliation given). *Acta Paediatr. Scand.* 63(Suppl. 4);656; 1974.

7308 A STUDY OF HL-A IN LYMPHOCYTES OF 53 PATIENTS WITH COELIAC DISEASE AND THEIR FAMILIES [Abstract]. (Eng.) Harms, K.; Albert, E. D.; Wank, R. (No affiliation given). *Acta Paediatr. Scand.* 63(Suppl. 4):656; 1974.

7309 APPLICATION OF THE ORGAN CULTURE METHOD TO PHYSIO-PATHOLOGICAL STUDIES IN COELIAC DISEASE [Abstract]. (Eng.) Jos, J.; Lenoir, G. (No affiliation given). *Acta Paediatr. Scand.* 63(Suppl. 4):655; 1974.

7310 HIRSCHSPRUNG'S DISEASE ASSOCIATED WITH ANASARCA AND HYPOPROTEINEMIA. (Eng.) Burke, J. A.; Belin, R. P. (Univ. Kentucky Coll. Medicine, Lexington, KY, 40506). *South. Med. J.* 68(8):1011-1013; 1975.

7311 THE EFFECTS OF INTESTINAL SOLUTE LOAD ON WATER SECRETION IN ACQUIRED MONOSACCHARIDE INTOLERANCE (AMI) [Abstract]. (Eng.) Klish, W. J.; Rodriguez, J. T.; Udall, J. N.; Rogers, J. H.; Nichols, B. L. (Baylor Coll. Medicine, Houston, TX 77025). *Pediatr. Res.* 10(4):356; 1976.

7312 PROTEIN-LOSING GASTROENTEROPATHY [Abstract]. (Eng.) Kondo, M.; Bamba, T. (Kyoto Pref. Univ. Medicine, Kyoto, Japan). *Gastroenterol. Jpn.* 10(3):236-237; 1975.

7313 STUDIES ON PROTEIN-LOSING GASTROENTEROPATHY [Abstract]. (Eng.) Baba, S.; Sato, K. (Dept. Surgery, Keio Univ., Tokyo, Japan). *Gastroenterol. Jpn.* 10(3):237; 1975.

7314 ENDOSCOPIC STUDY OF PROTEIN-LOSING GASTROENTEROPATHY [Abstract]. (Eng.) Takemoto, T.; Tanaka, M. (Tokyo Women's Medical Coll., Tokyo, Japan). *Gastroenterol. Jpn.* 10(3):235-236; 1975.

7315 PROTEIN-LOSING GASTROENTEROPATHY; CLINICAL STUDIES IN TWENTY-SEVEN PATIENTS. [Abstract]. (Eng.) Iwasaki, M.; Mizuno, Y. (Osaka Univ. Medical Sch., Osaka, Japan). *Gastroenterol. Jpn.* 10(3):235; 1975.

7316 SURGICAL AND PATHOLOGICAL STUDIES OF PROTEIN-LOSING GASTROENTEROPATHY [Abstract]. (Eng.) Iida, F. (Shinshu Univ. Sch. Medicine, Matsumoto, Japan). *Gastroenterol. Jpn.* 10(3):237-238; 1975.

7317 IMMUNOLOGICAL ABNORMALITIES IN CASES OF PROTEIN-LOSING ENTEROPATHY. (Eng.) Tsuchiya, M.; Asakura, A.; Morita, A.; Hibi, N. (Keio Univ. Sch. Medicine, Tokyo, Japan). *Gastroenterol. Jpn.* 10(3):236; 1975.

7318 SERUM VITAMIN B_{12} LEVELS IN PROTEIN-MALNOURISHED CHILDREN. (Eng.) Osito, B. O. A.; Adadevoh, B. K. (Dept. Nutrition, Faculty Medicine, Ibadan, Ibadan, Nigeria). *Nutr. Metabol.* 20 (1):9-13; 1976.

See also, 7263, 7266, 7389, 7408, 7613, 7630.

LARGE INTESTINE

7319 ASCENDING RETROCECAL APPENDICITIS. (Eng.) Meyers, M. A.; Oliphant, M. (New York Hosp.-Cornell Univ. Medical Center, 525 E. 68th St., New York, NY 10021). *Radiology* 110(2):295-299; 1974.

The characteristic radiographic findings associated with ascending retrocecal appendicitis are described, and three illustrative cases are summarized. The distinctive x-ray signs are irregular nodularity (often restricted to a specific haustral row) and spastic inflammatory changes, which may involve the posterolateral wall of the ascending colon anywhere along its length from the cecum to the hepatic flexure. The position of the appendix may be inferred from the location of the ileocecal valve when the appendix itself cannot be visualized. Barium opacification of the appendix does not exclude the diagnosis of acute appendicitis. The appendix may demonstrate mass displacement, sinus tracts. or communication with the abscess cavity. A 50-yr-old man underwent a right hemicolectomy and ileotransverse colostomy for a presumed x-ray diagnosis of carcinoma of the colon. The pathological specimen revealed a perforated appendix with a periappendiceal abscess. Retrospective examination of the x-ray films revealed sinus tracts extending from the tip of the appendix. The preoperative roentgenographic diagnosis in a 64-yr-old woman with periumbilical and right lower quadrant pain was extraperitoneal lymphoma. Barium enema disclosed masslike infiltration of the lateral wall of the proximal ascendin colon associated with displacement of an opacified ascending retrocecal appendix. Appendicitis with periappendiceal abscess was diagnosed at surgery. A 52-yr-old man was evaluated for right-sided abdominal pain 3.5 months after an uneventful cholecystectomy. Barium enema revealed a long ascending retrocecal appendix with a localized gaseous collection distal to the opacified tip. The clinical impression was subphrenic abscess related to the previous surgery. Appendicitis with retrocecal abscess was demonstrated at surgery. The complex of roentgen findings, e.g., irregular nodularity and spastic inflammatory changes, distinguishes ascending retroceal appendicitis from such conditions as granulomatous or ischemic colitis, tuberculosis, amebiasis, and carcinoma.

7320 MASSIVE COLONIC BLEEDING AND ORAL CONTRACEPTIVE "PILLS." (Eng.) Prust, F. W.; Kumar, G. K. (William Beaumont Hosp., Royal Oak, MI 48072). *Am. J. Obstet. Gynecol.* 125(5):695-698; 1976.

The cases of two patients on oral contraceptives who developed massive colonic bleeding are presented. The first patient, a 48-yr-old woman who had been on oral contraceptives (Ortho-Novum 1/80) for 5 yr, had cramping lower abdominal pain and a 12-hr history of bloody diarrhea. The second patient, a 19-yr-old woman, had been taking ASA (8-10/week) for several weeks and had been on birth control pills (Orval) for approximately 3 months. In both patients, a barium enema examination revealed thumbprinting and spasm, primarily in the ascending colon and hepatic flexure. Both patients became asymptomatic after the withdrawal of oral contraceptives. The first patient also received prednisone (10 mg, 4 x daily) as therapy for vasculitis due to estrogen, and had further resolution of her symptoms. The onset, course, and follow-up of these patients suggest contraceptive-induced mesenteric mucosal injury resulting in massive bleeding.

7321 COLORECTAL CANCER--PROGNOSTIC SIGNS IN "LOCAL DISEASE." (Eng.) Lerner, H. J. (Dept. Surgery, Pennsylvania Hosp., Eighth and Spruce St., Philadelphia, PA 19107). *J. Surg. Oncol.* 7(5):395-402; 1975.

A brief review of the clinical and pathological signs that affect the prognosis of colorectal cancer patients is presented. A high degree of cellular aplasia is a bad prognostic sign, as is penetration of the bowel wall. Venous invasion and spread to lymph nodes are also associated with poorer survival. The extent of venous invasion appears to be related directly to the cellular anaplasia, and it may also be correlated with the depth of wall penetration and the extent of lymphatic spread. Tumors arising in the rectum may have a greater propensity to invade veins than tumors elsewhere in the colon. Colorectal cancer may also spread by perineural invasion. In 100 surgically resected rectal specimens, 47% had lymphatic spread, 30% had perineural invasion, and 20% had venous invasion. Local recurrence is twice as likely in cases with perineural spread. Pain is a late and bad prognostic sign. Cancers below the peritoneal reflection have a greater local recurrence rate than those of the intraperitoneal colon. Factors contributing to the increased rate of local recurrence are the rich plexuses of veins and nerves in the lower colon and rectum, the lack of a protective peritoneal wall below the reflection, and the presence of a large tumor in a rigid pelvis, which hinders exposure and limits a wide resection. Surgical manipulation may mobilize intravascular emboli. Acute obstruction and perforation significantly reduce the chances for cure.

7322 RADIOTHERAPY FOR CANCER OF THE COLON. (Eng.) Backhouse, B. M.; Howard, N. (Charing Cross Hosp., London W6, England). *Clin. Oncol.* 1(3):245-251; 1975.

The results of radiotherapy in 28 patients with carcinoma of the colon or cecum are reported in an attempt to assess the value of this type of therapy. All patients had undergone previous surgery, and were treated with radiotherapy because of incomplete resection of the tumor or because of recurrence. One group of 12 patients was considered to have a good response to radiotherapy (3,225-5,300 rads). In one patient, a poorly differentiated adenocarcinoma of the cecum showed complete regression, and the patient is alive after 10 yr. One tumor occurring in another patient also showed complete regression, and partial regression was seen in eight other cases. The treatment resulted in relief of pain and other symptoms in 7 of the 12 patients. In addition, healing of a fistula in one patient and of an ulcer in another were seen. The survival rate in these 12 patients was 6 months-10 yr. In a second group of three patients treated with 3,500-5,400 rads, the treatment resulted in only a 3-4 month survival rate, and produced relief of pain in only two patients. A third group consisted of two patients given radiotherapy immediately following hemicolectomy for carcinoma of the cecum, as a preventative measure. In neither case was there evidence of metastasis. The one patient followed up is free of recurrence 4 yr after radiotherapy. The fourth group of 11 patients consisted of patients who were too ill to benefit from radiotherapy or those with distant metastases. In the four treated patients (1,000-4,600 rads), the survival was 1-11 months. The treatment resulted in partial regression of a mass in one patient and in pain relief in two others. The results suggest that radiotherapy is useful in the treatment of recurrent or incompletely excised tumors, particularly for the relief of pain.

7323 A REAPPRAISAL OF STAGING AND THERAPY FOR PATIENTS WITH CANCER OF THE RECTUM. I. DEVELOPMENT OF TWO NEW SYSTEMS OF STAGING. (Eng.) Feinstein, A. R.; Schimpff, C. R.; Hull, E. W. (West Haven Veterans Admin. Hosp., West Haven, CT). *Arch. Intern. Med.* 135(11):1441-1453; 1975.

Two new systems of staging and therapy for patients with cancer of the rectum were developed and applied to a cohort of 318 patients. The first system, which is applied before treatment, is divided into four composite stages that contain elements of symptomatic, chronometric, comorbid, and paramorbid data, as well as information obtained from physical examination, sigmoidoscopy, and roentgenography. The second system, applicable to patients with resected tumors, is based on a combination of pretherapeutic clinical information and postsurgical anatomic evidence. The two systems produced prognostic gradients that were clinically distinctive and statistically effective in these patients: symptomatic stage, 43%; topographic extensiveness, 42%; location, 16%; prognostic comorbidity, 21%; anemia, 19%; gastrointestinal tract comorbidity, 16%; comorbid gastrointestinal tract symptoms, 11%; allied comorbidity, 12%; age, 16%; and sex, 15%. The data derived from symptoms and chronometry provide vital distinctions, undetectable from anatomic staging alone, about the rate of growth and functional effects of the cancer. The data derived from diverse aspects of comorbidity provide other vital distinctions about the underlying conditions of the patient. These new staging systems are concluded to achieve their increased effectiveness by incorporating the important prognostic information that has hitherto been omitted from existing classification systems for patients with rectal cancer.

7324 ANALYSIS OF PATIENT DISABILITY AFTER CURATIVE RESECTION FOR COLONIC AND RECTAL CANCER.

(Eng.) Orces, H.; Feldman, J.; Gardner, B.; Alfonso, A. (Dept. Surgery, Downstate Medical Center, State Univ. New York, Brooklyn, NY). *Am. J. Surg.* 131(1):98-102; 1976.

Ninety-seven patients undergoing curative resection for colonic or rectal cancer were investigated to determine the degree of early disability (disability 1-4 yr postoperatively). To provide descriptive data for another site in which disability is generally acknowledged to be more limited, a series of 209 patients undergoing curative radical mastectomy were similarly followed up. Follow-up data were maintained monthly for 3 months, every 3 months for the next 2 yr, and every 6 months thereafter. Despite the more advanced stage of disease in patients with breast cancer, the probability of death or disability during the 4-yr period was only 47%, compared to 73% in the patients with colonic or rectal cancer. However, 71% of the 58 patients who died of colonic cancer had no disability (they were ambulatory and required no more than minimal assistance) during the 3-month period prior to their death, compared with 53% of the 66 patients who died of breast cancer. During the 4 yr, only 19 patients with colorectal cancer had any disability, and 17 of these patients died within an average of 14 months after experiencing the disability. Eighty-six percent of patients undergoing curative resection for colonic or rectal cancer who survived 1 or 2 yr were not disabled. At the 3 yr interval, only 1 of 27 living patients was disabled, and at 4 yr, none of 14 living patients was disabled. Similar observations were noted among the breast cancer patients. These figures indicate that the probability of disability at a single point in time diminishes as the interval from curative surgery lengthens. The probability of disability among patients with colorectal cancer increased rapidly during the first 3 months after surgery to about 14% and then increased gradually to about 28% during the next 27-month period. In patients less than 65 yr old, the probability of death or disability at the end of the 4 yr was 55%; this was similar to that seen in the breast cancer patients (52%). For patients with colorectal cancer who were less than 65 yr old, the probability of disability (excluding death) increased to a peak of slightly less than 20% at 15 months after surgery and remained at that level throughout the study. These results suggest that the current policy of waiting 5 yr to determine cure in this disease wastes many years of active employment.

7325 DIVERTICULAR DISEASE: THREE STUDIES. PART I—RELATION TO OTHER DISORDERS AND FIBRE INTAKE. PART II—TREATMENT WITH BRAN. PART III—METABOLIC EFFECT OF BRAN IN PATIENTS WITH DIVERTICULAR DISEASE.

(Eng.) Brodribb, A. J. M.; Humphreys, D. M. (Radcliffe Infirmary, Oxford, OX2 6HE, England). *Br. Med. J.* 1(6007):424-430; 1976.

The actual fiber intake of patients with diverticular disease was compared with that of the general population, and the use of wheat bran in the treatment of diverticular disease was evaluated. Forty patients with diverticular disease comprised the study group, along with 80 age- and sex-matched controls. The crude-fiber intake for the patients was 2.6 g/day, for the control group, it was 5.2 g/day ($p<0.00003$). Crude fiber, a measure of the cellulose and lignin content, considerably underestimates the total dietary fiber, as hemicelluloses are not considered. A significantly increased incidence of hemorrhoids, varicose veins, abdominal hernias, hiatal hernia, and gallstones was noted in the patients. Treatment with wheat bran (24 g/day) for at least 6 months resulted in very satisfactory clinical responses in 33 cases. Sixty percent of all symptoms were abolished, and 28% of symptoms were exacerbated. Bran accelerated the transit time in 18 patients whose initial times were slower than 60 hr. It slowed the transit time in six patients whose initial times had been faster than 36 hr. In 15 patients with transit times of 36-60 hr, the time was unaffected by bran treatment ($p<0.006$). A significant increase was noted in stool weight ($p<0.0002$), and the number of intracolonic high-pressure waves decreased, especially those over 30 mm Hg during and after eating ($p<0.003$ and <0.0001, resp.). After 6 months of bran treatment, the oral glucose tolerance curve fell, fecal fat excretion increased, the serum lipoprotein pattern was altered, urinary calcium excretion was reduced, and the serum folate level fell. These changes do not contraindicate the use of bran in the treatment of diverticular disease. The findings support the concept that a fiber-depleted diet is a causative factor in diverticular disease. It is suggested that a high-fiber diet may not only relieve the symptoms of diverticular disease, but may also prevent the condition from developing.

7326 A CURRENT APPRAISAL OF PROBLEMS WITH GANGRENOUS BOWEL. (Eng.) Barnett, W. O.; Petro, A. B.; Williamson, J. W. (Dept. Surgery, Univ. Mississippi Medical Center, Jackson, MS). *Ann. Surg.* 183(6):653-659; 1976.

The hospital records of a group of 151 cases of bowel gangrene were analyzed. The overall mortality rate was 37%: 20% for 45 cases of hernia, 23% for 43 cases of adhesions, 74% for 42 cases of mesenteric insufficiency, and 28% for 21 cases of miscellaneous conditions resulting in gangrenous bowel. Among the cases of hernia, adhesions, and mesenteric insufficiency, mortality was higher in patients over 50. The mortality rate was 14% of 22 patients with inguinal hernia, 21% of 14 patients with umbilical or incisional hernias, and 2/3 patients with femoral hernia. Five of the hernia mortalities were deemed salvagable had better care or earlier treatment been available. Survival was related to prompt surgical intervention, as indicated by a 5% mortality rate for patients treated within 36 hr of the onset of symptoms and a 25% rate for those treated after 36 hr. Among 13 patients with adhesions who were treated within 36 hr, the mortality rate was 8%, compared to 25% for those treated later. The overall mortality of the 43 cases was 23%, 8 of which could have been prevented with better treatment and quicker surgical intervention. Among the 42 cases of mesenteric insufficiency, the diagnosis was made at autopsy in 8; 34 underwent surgical exploration. The mortality rate among eight who were treated within 36 hr was 37%, compared to 76% for those treated later. Among the 27 cases in which bowel resection was performed, the mortality rate was 40%. Of the total 42 cases, 3 could have been salvaged with more expeditious management. In all three groups, survival was better among patients who had more than 100 cm of bowel resected than among patients with less than 100 cm resected. This may be due to the more severe clinical symptoms in the former leading to a prompter intervention. The importance of early intervention is underscored, as is the liberal administration of antibiotics to delay intractable hypotension. Nasogastric tubes should not be used as definitive treatment for the patient with complete obstruction.

7327 A MAJOR ADVANCE IN THE MANAGEMENT OF PNEUMATOSIS COLI. (Eng.) Britten-Jones, R. (Lister House, 142 Ward St., North Adelaide, South Australia 5006). *Aust. N.Z. J. Surg.* 45(4):367-371; 1975.

The cases of two elderly patients with pneumatosis coli successfully treated by inhaling high concentrations of oxygen over a 5-day period are presented. The first patient, an 82-yr-old woman, had a 12-month history of diarrhea and a 6-month history of fecal incontinence. A mass was palpable in the region of the distal transverse and descending colon, and a polypoid cystic tumor was palpated through the rectum. Sigmoidoscopy revealed multiple submucosal cysts involving the upper half of the rectum and lower sigmoid colon, and histological examination and barium enema examination confirmed the presence of widespread pneumatosis coli. Treatment with codeine phosphate and Lomotil was unsuccessful. Within 24 hr of treatment with oxygen (administered continuously through an intranasal catheter at 12 l/min), the diarrhea had ceased. After 2 more days, the abdominal and rectal masses became impalpable, and a plain skiagram of the abdomen showed a marked reduction in the size of the cystic gas-filled spaces in the wall of the colon. After 5 days, sigmoidoscopy and barium enema examination revealed a normal rectum and sigmoid. The patient has been asymptomatic for 15 months. The second patient, an 82-yr-old man, had a 4-yr history of diarrhea and fecal incontinence. Cysts extended from the lower rectum to the mid-descending colon, and the bowel symptoms persisted despite treatment with Lomotil and codeine phosphate. After 4 days of treatment with oxygen (initial level 8 l/min, increased to 10 l/min), the diarrhea disappeared, and the next day, sigmoidoscopy and plain abdominal x-ray films were normal. If used with caution, oxygen treatment is a safe, simple, and effective method of treatment for pneumatosis coli.

7328 LESIONS ASSOCIATED WITH FAMILIAL POLYPOSIS COLI: STUDIES OF LESIONS OF THE STOMACH, DUODENUM, BONES, AND TEETH. (Eng.) Ushio, K.; Sasagawa, M.; Doi, H.; Yamada, T.; Ichikawa, H.; Hojo, K.; Koyama, Y.; Sano, R. (Dept. Diagnostic Radiology, National Cancer Center Hosp., Tsukiji 5-1-1, Chuoku, Tokyo, Japan). *Gastrointest. Radiol.* 1(1):67-80; 1976.

The entire gastrointestinal tract and bones of 24 patients with familial polyposis coli were examined after a routine medical examination. Polypoid lesions of the stomach were observed in 15 of 22 cases. The lesions were always multiple, and were scattered all over the stomach, with the highest incidence in the gastric body and fornix. In one case, multiple adenomas with atypical epithelium and microscopic intramucosal adenocarcinoma were detected in the lower part of the stomach, while atypical epithelium was detected in the pyloric gland areas in another patient. No correlations were observed between the number of polyps in the stomach and polypoid lesions in the large intestine. Of 10 cases in which duodenal examinations were performed, polypoid lesions were found in 9, and adenomas were found in 5. Exostosis, osteomatosis, and cortical thickening were observed in 9 of 18 patients undergoing bone survey. Panoramic radiography of the maxilla and mandible was carried out in 16 cases, and multiple osteosclerotic areas of the mandible were observed in 13. Soft tissue tumors were observed in three cases, and ileus attributable to mesenteric desmoid tumor was observed in one case. Familial polyposis coli is a disease that produces polypoid lesions not only in the large intestine, but in the stomach and duodenum as well. The authors also conclude that familial polyposis coli and Gardner's Syndrome are similar, and that both should be regarded as a systemic disease with a predisposition to multiple tumor formation.

7329 THE RADIOLOGICAL DEMONSTRATION OF COLORECTAL POLYPS UNDETECTED BY ENDOSCOPY. (Eng.)

Laufer, I.; Smith, N. C. W.; Mullens, J. E. (McMaster Univ. Medical Centre, Hamilton, Ontario, Canada L8S 4J9). *Gastroenterology* 70(2):167-170; 1976.

The value of double contrast radiology in the detection of colorectal polyps occurring in potential endoscopic blind spots was illustrated in a survey of 800 routine double contrast studies of the colon. In this series, 119 polyps were diagnosed radiologically in 78 patients. Follow-up studies were available in 46 patients with 72 polyps; only 56 of these polyps were found on the initial endoscopic examination. Of the remaining 16 polyps, repeat endoscopy revealed 5 polyps, and repeat radiology revealed 1 polyp. Repeat radiology revealed that there was no polyp in six cases, and there was no further investigation in the four remaining cases. The polyps that were missed by the initial endoscopic examination were usually located in the rectum behind the valve of Houston or in any area of the colon where there was sharp angulation. Three cases illustrating these blind spots are presented. In the first patient, the initial double contrast study demonstrated a 1-cm polyp in the distal transverse colon just proximal to the splenic flexure; repeated colonoscopic examinations failed to demonstrate this lesion. The double contrast study was repeated, and the polyp was finally found and removed at a subsequent colonoscopic procedure. In the second patient, a 1-cm polyp in the descending colon where the junction of the sigmoid and descending colon resulted in sharp angulation was overlooked at the initial colonoscopic examination. In the third patient, the hidden lesion occurred in the rectum just behind the valve of Houston. These cases illustrate the importance of high quality radiological study of the colon and the complementary nature of radiology and endoscopy in the detection of colorectal polyps.

7330 VOLVULUS OF THE COLON--A CONTINUING SURGICAL PROBLEM. (Eng.)

Nemer, F. D.; Hagihara, P. F.; Mays, E. T.; Griffen, W. O., Jr. (Dept. Surgery, Univ. Kentucky Coll. Medicine, Lexington, KY 40506). *Dis. Colon Rectum* 19(4):321-329; 1976.

A retrospective analysis of 26 cases of volvulus of the colon is presented. All but three had significant associated diseases. The duration of obstructive symptoms varied from 8 hr to 5-6 days. Abdominal distention was universally present, and nausea and vomiting were common. A plain film of the abdomen suggested the diagnosis in 25/26, and only eight cases required confirmation by barium enema. The sigmoid was the involved site in 15, the cecum in 10, and the transverse colon in 10. Barium studies were diagnostic in five cases of sigmoidal volvulus and therapeutic in two. They were diagnostic in three cases of cecal vovulus, but therapeutic in none. Three patients were not subjected to operation. One moribund patient died within 30 min of admission, and two patients with sigmoidal volvulus were decompressed by proctoscopy or colonoscopy. Of the remaining 23, 16 underwent emergency surgical procedures, 5 of which died postoperatively. Seven patients underwent elective surgery, and there was no associated mortality. The overall mortality in the series was 5/26 (3/10 cecal, 1/15 sigmoidal, and 1/1 transverse colon). Necrotic bowel was found in only one of the postoperative deaths, indicating that the need for emergency surgery, not necrotic bowel per se, was the principal cause of death in these generally debilitated patients. Six of the seven patients who underwent elective procedures had been converted from emergency to elective surgical status by nonoperative decompression, and the seventh underwent an elective procedure after a sixth recurrence. It is suggested that conversion to elective operative status by nonsurgical means will improve the mortality rate, and such a plan of treatment is outlined.

7331 VOLVULUS OF THE SIGMOID COLON IN BRAZIL: A REPORT OF 230 CASES. (Eng.)

Gama, A. H.; Haddad, J.; Simonsen, O.; Warde, P.; Manzione, A.; Da Silva, J. H.; Ioshimoto, M.; Cutait, D.; Raia, A. (Faculdade de Medicina, Universidade de Sao Paulo, Rua Padre Joao Manoel, 800 apto. 11, 01411 Sao Paulo, Brazil). *Dis. Colon Rectum* 19(4):314-320; 1976.

The etiology, pathophysiology, diagnosis, and treatment of sigmoidal volvulus are reviewed and a series of 230 cases (average age, 40 yr) treated since 1938 is presented. Both congenital and acquired factors have been implicated in the etiology, and in Brazil, sigmoidal volvulus is thought to be a frequent complication of megacolon resulting from Chagas' disease. Among 35 patients treated by 60 surgical procedures in the period 1938-1952, there were 9 deaths, compared to 7/86 in 1953-1964 and 4/109 in 1965-1974. In the entire series, there were 54 recurrences: 35 following simple surgical detorsion and 9 following endoscopic emptying of the volvulus. Of the total of 20 deaths, 15 were due to peritonitis and 5 to miscellaneous causes. Recommended treatment consists of endoscopic emptying in cases without clinical, x-ray, or endoscopic signs of intestinal ischemia. In cases of complicated volvulus or when a loop cannot be emptied, laparotomy is indicated. When a simple volvulus is found at surgery, the loop should be untwisted and the gaseous contents siphoned off via a rectal catheter. The Hartmann operation is recommended in cases of necrotic bowel. Because of the frequency of recurrence following endoscopic emptying or surgical detorsion, definitive treatment of the megacolon should be carried out as soon as possible after initial treatment of the volvulus.

7332 MUCOSAL FLORA OF THE HUMAN COLON [Abstract]. (Eng.)

Peach, S. L.; Drasar, B. S.; Hawley, P. R.; Hill, M. J.; Marks, C. G. (Bacterial Metabolism Res. Lab., Colindale, London, England). *Gut* 16(10):824; 1975.

7333 APPEARANCE OF A DISCRETE HUMAN HEMOGLOBIN DERIVATIVE IN THE FECES [Abstract]. (Eng.)

Burton, R. M.; Landreth, K. S.; Barrows, G. H.; Jarrett, D. D.; Songster, C. L. (Univ. Louisville, Sch. Medicine, Louisville, KY 40202). *Fed. Proc.* 35(7): 1258; 1976.

7334 ADVANCES IN THE DIAGNOSIS OF DISTURBANCES OF THE RECTOSIGMOID IN CHILDREN: SURGICAL PROCEDURES [Abstract]. (Eng.) Willital, G. H.; Groitl, H.; Schwandner, R.; Zeisser, E.; Riedl, L.; Dobroschke, J. (Chirurgische Universitatsklinik Erlangen, Nurnberg, Nurnberg, Germany. *Langenbecks Arch. Chir.* 339(107):656; 1975.

7335 EFFECTS OF SOME WATER-SOLUBLE CONTRAST MEDIA ON THE COLONIC MUCOSA. (Eng.) Lutzger, L. G.; Factor, S. M. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *Radiology* 118(3):545-548; 1976.

7336 EFFICACY OF TWO MINOR TRANQUILIZERS IN RELIEVING SYMPTOMS OF FUNCTIONAL GASTROINTESTINAL DISTRESS. (Eng.) Baume, P.; Tracey, M.; Dawson, L. (Parliament House, Canberra, A.C.T. 2600, Australia). *Aust. N.Z. J. Med.* 5(6):503-506; 1975.

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7340 LEVATORPLASTY: A SECONDARY OPERATION FOR FECAL INCONTINENCE FOLLOWING PRIMARY OPERATION FOR ANORECTAL AGENESIS. (Eng.) Puri, P.; Nixon, H. H. (Hosp. Sick Children, Great Ormond St., London, WC1N 3JH, England). *J. Pediatr. Surg.* 11 (1):77-82; 1976.

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7346 SIGNIFICANCE OF PRECANCEROUS LESIONS IN THE COLON AND RECTUM. (Eng.) Laumonier, R. (Centre Henri Becquerel, Rue d' Amiens, 76038 Rouen Cedex, France). *Biomedecine* 22(5):358-367; 1975.

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7348 LARGE BOWEL CANCER: CAUSATION AND MANAGEMENT. (Eng.) McIllMurray, M. B.; Langman, M. J. S. (City Hosp., Nottingham, England). *Gut* 16(10):815-820; 1975.

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7375 LARGE-BOWEL POLYPECTOMY VIA THE COLONOSCOPE: EXPERIENCE WITH 80 POLYPS. (Eng.) Penfold, J. C. B. (Repatriation General Hosp., Heidelberg, Victoria 3077, Australia). *Aust. N.Z. J. Surg.* 45(4):364-367; 1975.

7376 COLONIC NECROSIS IN HENOCH-SCHOENLEIN PURPURA. (Eng.) Bonomi, P. D.; Cera, P. J. (No affiliation given). *Bull. Geisinger Med. Ctr.* 27(3):67-72; 1975.

7377 SPONTANEOUS RUPTURE OF THE RECTOSIGMOID COLON WITH ANAL EVISCERATION: A NEW COMPLICATION OF UTERINE PROLAPSE. (Eng.) Shafiroff, B. B.; Carnevale, N.; Delany, H. M. (Montefiore Hospital and Medical Center, Montefiore-Morrisania Affiliate, Albert Einstein Coll. Medicine, Bronx, NY). *Surgery* 79(3):360-362; 1976.

7378 DIAGNOSIS OF THE TUBERCULOSIS OF THE LARGE INTESTINE [Abstract]. (Eng.) Yukawa, E. (Yukawa Gastroenterological Hosp., Yukawa, Japan). *Jpn. J. Med.* 14(2):118-119; 1975.

7379 GUNSHOT WOUNDS OF THE COLON. A REVIEW OF 100 CONSECUTIVE PATIENTS, WITH EMPHASIS ON COMPLICATIONS AND THEIR CAUSE. (Eng.) Haygood, F. D.; Polk, H. C., Jr. (Univ. Louisville Sch. Medicine, Health Sciences Center, Louisville, KY 40201). *Am. J. Surg.* 131(2):213-218; 1976.

7380 RIGHT-LOWER-QUADRANT PAIN WITH A FILLING DEFECT IN THE CECUM. (Eng.) Margolies, M. N.; Vickery, A. L., Jr. (Massachusetts General Hosp., Boston, MA). *N. Engl. J. Med.* 295(12):666-670; 1976.

See also, 7101, 7106, 7107, 7122, 7126, 7152, 7154, 7156, 7160, 7198, 7268, 7281, 7282, 7284, 7287, 7289, 7336, 7393, 7611, 7615, 7616, 7630, 7632, 7637, 7640, 7654, 7665, 7677.

LARGE INTESTINE

Ulcerative Colitis

7381 STUDY OF THE ULTRASTRUCTURAL PATHOLOGY OF ULCERATIVE COLITIS. (Ger.) Otto, H. F.; Gebbers, J. O.; Muller-Wieland, K. (Pathologisches Institut der Universitat, D-2000 Hamburg 20, Martinstr. 52, W. Germany). *Virchows Arch.* [*Pathol. Anat.*] 367(2):113-130; 1975.

An electron microscope study of membrane modification and cell interaction in ulcerative colitis (UC) is reported. Biopsies were taken from 37 UC patients, all less than 50 yr of age, either at the time of onset or during a crisis. Epithelial hyperplasia was marked, especially superficially and deep in the mucosal crypts. Columnar cell microvilli were rarefied. There was a plethora of small round bodies both in normal and UC colonic mucosa. The glycocalices showed acute changes. In the basal region of the lamina, epithelialis mucosae membrane folds were linked to lymphocyte clusters. The interepithelial spaces appeared narrow and the epithelial cells contained intranuclear areas of round granular or long, membrane-bound structures. Interepithelial lymphocyte numbers were abnormally high; eosinophils were confined to the crypt abscesses. In the stratum proprium mucosae, the inflammatory infiltrate consisted mainly of small lymphocytes and plasma cells. The lymphocyte cytoplasm was organelle-rich, with extensive processes and micropinocytotic vesicles; the nuclei were deeply invaginated. The full spectrum of plasma cells was present, unlike normal colon, especially Turk cell types containing Russel bodies. The number of macrophages was abnormally high, even more than that in colon carcinoma. Their cytoplasm was filled with phagolysosomes and ingesting vesicles; the processes were typically fingered. The phagocytic cells with dense bodies, well-developed Golgi apparatus, and light cytoplasm were clearly differentiated from macrophages. Abnormally high numbers of mast cells were found in mucosal stroma and were directly related to enterochromaffin cells; some contained dense homogeneous inclusions. The various cell assemblies are seen as expressions of functional interaction and integration and the cell modifications as expressions of an incomplete mucosa-block, associated with immunoglobulin A and secretory-piece deficit.

7382 RESPONSES TO DRUG THERAPY IN ULCERATIVE COLITIS. EVALUATION BY RECTAL BIOPSY AND MUCOSAL CELL COUNTS. (Eng.) Korelitz, B. I.; Sommers, S. C. (Lenox Hill Hosp., 100 East 77th St., New York, NY 10021). *Am. J. Dig. Dis.* 21(6):441-447; 1976.

Using the technique of cell counting, rectal biopsies of active untreated ulcerative colitis and of treated cases with positive or negative sigmoidoscopic findings were analyzed to evaluate response to medical therapy. The effects of the administration of salicylazosulfapyridine (SAS), prednisone, and 6-mercaptopurine, singly and in combinations, were analyzed and compared statistically with the results of the ulcerative colitis and noncolitis control groups. Active disease was associated with decreased epithelial goblet cells and increased fragmented nuclei. Lamina propria eosinophils decreased with successful responses to therapy. SAS was correlated with reduced chronic inflammation, as indicated by fewer plasma cells. Prednisone was associated with significantly diminished acute inflammation, as reflected by decreased neutrophils. Treatment with 6-mercaptopurine was followed by a reduction in both acute and chronic inflammation and an increase in mast cells. Macrophages, indicators of resolving inflammation, were significantly increased after drug combinations that included 6-mercaptopurine. It is concluded that a new and potentially successful method for evaluating the effects of medical treatment and individual drug therapy in the management of ulcerative colitis has been demonstrated.

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7386 BILE ACID POOLS IN INFLAMMATORY BOWEL DISEASE [Abstract]. (Eng.) Williams, C. N.; Macdonald, I. A. (Dept. Medicine, Dalhousie Univ., Halifax, Nova Scotia). *Clin. Res.* 23(5): 623A; 1975.

7387 DIVERTICULAR DISEASE OF THE COLON: A BANE OF THE ELDERLY. (Eng.) Painter, N. S. (Manor House Hosp., London, England). *Geriatrics* 31(2):89-94; 1976.

See also, 7630, 7670, 7679

LARGE INTESTINE

PANCREAS

7388 ANGIOGRAPHY IN DISEASE OF THE PERIPANCREATIC LYMPH NODES. (Eng.) Tylen, U. (Dept. Diagnostic Radiology, Univ. Hosp., S-221 85 Lund, Sweden). *Acta Radiol.* [*Diagn.*] *(Stockh.)* 16(6):625-632; 1975.

Angiography was performed in six patients with malignant lymphoma, three of whom had reticulum cell sarcoma, and in two patients with metastatic involvement of the peripancreatic lymph nodes. Angiography of the celiac and superior mesenteric arteries was done in all the cases in antero-posterior and right posterior oblique projections; in three patients lateral views were also done. The three patients with reticulum cell sarcoma showed stenosis of the splenic artery; the stenosis had an irregular outline in two. In all three, the tail of the pancreas was richly vascular, and the small arteries were tortuous and irregular. The splenic vein was occluded in one case and severely stenosed in two. The lateral views showed the main stem of the superior mesenteric artery to be displaced ventrally. Of the three patients with other malignant lymphomas, two had slight smooth long tapering stenosis in the splenic and hepatic arteries. The gastroduodenal artery and the pancreatic arcades were displaced and stretched in two patients, due to an avascular expansive lesion. The superior mesenteric artery was displaced ventrally in one patient, and the portal and splenic veins were stenosed in one patient each. Metastasis of a seminoma to the lymph nodes around the pancreas in one patient caused displacement of the gastroduodenal and the pancreatic arcades. The patients with metastases to the peripancreatic lymph nodes from a prostatic carcinoma had complete stenosis of the celiac artery and a long smooth stenosis of the common hepatic artery. The pancreatic arcades were dilated and tortuous, presumably due to collateral circulation from the superior mesenteric artery. In the entire series of eight patients, four showed displacement of the kidney pelvis or ureter by enlarged lymph glands. The findings were similar, in general, to those of pancreatitis and pancreatic carcinoma. The results demonstrate that vascular abnormalities demonstrated by angiography are often unspecific.

7389 SMALL BOWEL STRUCTURE AND FUNCTION IN PANCREATIC STEATORRHEA. (Eng.) Bank, S.; Marks, I. N.; Novis, B. H. (J. 1 Observatory, Groote Schuur Hosp., Cape Town, 7925 South Africa). *Mt. Sinai J. Med. N.Y.* 42(6):552-564; 1975.

The applicability of direct and indirect tests of small bowel function and structure to patients with pancreatic steatorrhea was evaluated. The most common abnormality was a diminished absorption of a 25-g load of D-xylose (<4.3 g in 5 hr) found in 6/60 patients. Grossly impaired vitamin B_{12} absorption occurred in 4 (<3% of administered dose in 24 hr), and 30% had urinary excretion levels (3%-8%) compatible with small bowel malabsorption. Very high chemical fecal fat levels, >25 g/day, appeared in three patients who handled fatty foods poorly. Partial villous atrophy of the jejunal mucosa was noted in only four patients. One patient had an increased urinary indican excretion. No patient demonstrated protein-losing enteropathy, and the disaccharidase activity of the small bowel mucosa was not impaired quantitatively and qualitatively. An abnormal or frankly diabetic glucose tolerance test was noted in 93% of the patients. Pancreatic replacement therapy and total dietary fat restriction improved B_{12}, xylose, and free fatty acid abnormalities, but not to normal levels. Although reproducible results were not always achieved, normal and abnormal values could be separated on successive testing. The abnormal tests did not constitute associated small bowel malabsorption, but they may present a physical defect of absorption due to intraluminal factors associated with the steatorrhea. The finding of two or more abnormalities in the same patient suggests the presence of associated small bowel disease.

7390 BLUNT PANCREATIC AND PANCREATICODUODENAL TRAUMA. (Eng.) Heyse-Moore, G. H. (Plymouth General Hosp., Plymouth, Devonshire, England). *Br. J. Surg.* 63(3):226-228; 1976.

7391 LYMPHANGIOMA OF PANCREAS. (Eng.) Gregory, I. L. (Little Falls Hosp., 10 Whited St., Little Falls, NY 13365). *N.Y. State J. Med.* 76(2): 289-291; 1976.

7392 SOME AUTOPSY FINDINGS IN MALIGNANT PANCREATIC LESIONS [Abstract]. (Eng.) Havig, O. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 10(Suppl. 34):23-24; 1975.

7393 OCCULT APPENDICEAL ABSCESS COMPLICATING CYSTIC FIBROSIS. (Eng.) Holsclaw, D. S.; Habboushe, C. (Hahnemann Medical Coll., New College Building, 230 North Broad St., Philadelphia, PA 19102). *J. Pediatr.* 11(2):217-221; 1976.

7394 PURIFICATION AND PROPERTIES OF HUMAN ACID-THERMOSTABLE RIBONUCLEASES, AND DIAGNOSIS OF CHILDHOOD PANCREATIC FIBROSIS. (Eng.) Bardon, A.; Sierakowska, H.; Shugar, D. (Natl. Res. Inst. Mother and Child, 01-211 Warszawa, Poland). *Clin. Chim. Acta* 67(3):231-243; 1976.

7395 THE CLINICAL SIGNIFICANCE OF THE PANCREAS DIVISUM. (Eng.) Rosch, W.; Koch, H.; Schaffner, O.; Demling, L. (Medizinische Universitatsklinik, Krankenhausstr. 12, D-852 Erlangen, W. Germany). *Gastrointest. Endosc.* 22(4):206-207; 1976.

7396 RUPTURE OF A SPLENIC ARTERY ANEURYSM INTO THE PANCREATIC DUCT. (Eng.) Bowers, J.; Koehler, P. R.; Hammar, S. P.; Nelson, J. A.; Tolman, K. G. (Univ. Utah Coll. Medicine, Salt Lake City, UT). *Gastroenterology* 70(6):1152-1155; 1976.

7397 REVIEW: THE ROLE OF CALCIUM IN PANCREATIC SECRETION AND DISEASE. (Eng.) Goebell, H. (Dept. Internal Medicine, Univ. Essen, Essen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 23(2): 151-164; 1976.

7398 CHANGES IN PANCREATIC BICARBONATE RESPONSE TO EXOGENOUS SECRETIN FOLLOWING PROXIMAL GASTRIC VAGOTOMY FOR DUODENAL ULCER [Abstract]. (Eng.) Berstad, A.; Roland, M.; Petersen, H.; Liavag, I. (Aker Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 10(Suppl. 34):18-19; 1975.

7399 IMPROVING TRENDS WITH PANCREATODUODENECTOMY. (Eng.) Spratt, J. S., Jr. (Cancer Res. Center, Business Loop & 70 Garth Ave., Columbia, MO 65201). *Am. J. Surg.* 131(2):239-241; 1976.

See also, 7080, 7109, 7110, 7134, 7225, 7404, 7423, 7453, 7461, 7466, 7572, 7589, 7591.

PANCREAS

Pancreatitis

7400 THE BEHAVIOR OF MUCOPOLYSACCHARIDE IN THE PANCREATIC JUICE IN CHRONIC PANCREATITIS. (Eng.) Wakabayashi, A.; Takeda, Y. (Second Dept. Medicine, Osaka Medical College, 2-7, Daigaku-cho, Takatsuki, 569, Japan). *Am. J. Dig. Dis.* 21(8):607-612; 1976.

The behavior of hexosamine in the pancreatic juice was studied in 37 patients with chronic pancreatitis, 6 with alcoholism, 13 with gallstones, and 11 with peptic ulcers. After a 10-min basal sample of the duodenal contents (during a fast) was taken, pancreozymin (1 U/kg, i.v.) was injected, and the duodenal contents were collected for an additional 40 min. Then secretin (1 U/kg) was injected, and the duodenal contents were collected for 60 min. The hexosamine concentration in the fraction taken 20-40 min following secretin injection was taken as the measure of pancreatic hexosamine in the duodenal aspirate. There was a negative correlation between hexosamine concentration and either the volume output or the bicarbonate output in this fraction. The hexosamine concentration was 0.034 ± 0.005 mg/ml in the controls and 0.163 ± 0.028 mg/ml in suspected chronic pancreatitis, 0.198 ± 0.043 mg/ml in established chronic pancreatitis, 0.108 ± 0.029 mg/ml in alcoholism, 0.051 ± 0.010 mg/ml in gallstone, and 0.055 ± 0.010 mg/ml in peptic ulcer patients. The values in alcoholism and chronic pancreatitis were significantly higher than those in controls ($p<0.05$). Hexosamine levels were 0.261 ± 0.072 mg/ml, in alcoholic pancreatitis, followed by 0.197 ± 0.102 mg/ml in idiopathic pancreatitis, 0.112 ± 0.038 mg/ml in pancreatitis caused by gallstones, 0.379 ± 0.085 mg/ml in chronic relapsing pancreatitis, and 0.113 ± 0.027 mg/ml in chronic nonrelapsing pancreatitis. Among the 22 established cases of pancreatitis, the value was 0.230 ± 0.226 mg/ml in 11 cases of chronic noncalcifying pancreatitis, as opposed to only 0.116 ± 0.089 mg/ml in 11 cases of chronic calcifying pancreatitis. The results suggest that rises in hexosamine concentration can be caused by alcohol ingestion and that the high values in relapsing alcoholic pancreatitis may be due to mucosubstance increases related to acute attacks accompanying ductal obstruction.

7401 PANCREATITIS AND THE BATTERED CHILD SYNDROME: REPORT OF 2 CASES WITH SKELETAL INVOLVEMENT. (Eng.) Slovis, T. L.; Berdon, W. E.; Haller, J. O.; Baker, D. H.; Rosen, L. (The Children's Medical and Surgical Center, 622 W. 168 St., New York, NY 10032). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(2):456-461; 1975.

Two cases illustrating the clinical and roentgenographic spectrum of traumatic pancreatitis in children are presented. The first patient, a 2-yr-old boy, presented with vomiting, a bruised, tender abdomen, and lethargy following a beating. He became oliguric, the blood urea nitrogen level rose to 80 mg%, and he developed hematuria. The initial skeletal survey was normal. Three days after admission, an i.v. pyelogram showed normal kidneys, and an upper gastrointestinal series showed a widened duodenal sweep with edematous changes. The patient slowly recovered with supportive therapy and antibiotics. He developed widespread painful skeletal lesions on the 17th hospital day. Roentgenograms of the feet showed widespread intramedullary necrosis of the metatarsals and phalanges and considerable periosteal new bone reaction. Larger destructive lesions in the tibial metaphysis were also noted. The upper extremities, which were clinically normal, showed medullary destruction and periosteal new bone reaction. Diffuse bone lesions accompanying pancreatitis were diagnosed. The patient recovered without treatment. The second patient, a 19-month-old girl, presented with hematemesis, hypoactive bowel sounds, a nontender abdomen, lethargy, and oliguria. A plain film of the abdomen revealed no evidence of free air and only a dilated loop of jejunum. An upper gastrointestinal series showed a widened duodenal sweep and thick small bowel folds. An i.v. pyelogram showed the liver displaced medially by ascites and normal kidneys. A bone survey showed long bone fractures, but was otherwise normal. A repeat upper gastrointestinal series showed duodenal obstruction, with a mass impinging on the medial aspect of the descending duodenum. Laparotomy revealed peritonitis secondary to acute hemorrhagic pancreatitis. There was extensive necrosis of the omentum and transverse mesocolon reflecting leakage of pancreatic enzymes. The entire pancreas was indurated and hemorrhagic, as were the structures of the lesser sac. The mass obstructing the duodenum was an abscess, and drainage was mandatory. The patient slowly recovered on hyperalimentation, and she was discharged 3 months after admission. Repeat skeletal survey failed to show evidence of medullary necrosis with periosteal new bone reaction. These cases indicate that diffuse periosteal reaction, lytic lesions, ascites, duodenal obstruction, and the roentgenographic signs of pancreatitis should now be included among the findings in the battered child syndrome.

7402 URINARY EXCRETION OF ORALLY ADMINISTERED COMPOUND E-2663 (WARREN-TEED): A NEW TEST OF EXOCRINE PANCREATIC FUNCTION [Abstract]. (Eng.) Feinerman, A. E.; Rittgers, R. A.; Loewenstein, M. S.; Zamcheck, N. (Boston City Hosp., Boston, MA). *Clin. Res.* 24(3):283A; 1976.

7403 SALIVARY AND PANCREATIC AMYLASE CLEARANCES IN NORMALS AND IN PANCREATITIS [Abstract]. (Eng.) Long, W. B.; Grider, J. R., Jr. (Philadelphia General Hosp., Philadelphia, PA.) *Clin. Res.* 23(4): 482A; 1975.

7404 DISCRIMINANT ANALYSIS IN DIAGNOSTIC EVALUATION OF EXOCRINE PANCREATIC FUNCTION PARAMETERS FOLLOWING SECRETIN AND PANCREOZYMIN STIMULATION.

(Eng.) Dobrilla, G.; Vantini, I.; Vallaperta, P.; Mirachian, R.; Cavallini, G.; Angelini, G.; Scuro, L. A. (III Medical Clinic, Univ. Padova at Verona, Verona, Italy). *Rend. Gastroenterol.* 7(1):16-22; 1975.

7405 HOW WE HANDLE GI BLEEDING AND PANCREATITIS. (Eng.) Wantz, G. E. (New York Hosp.-Cornell Medical Center, NY). *Res. Staff Phys.* 22(2):86-98, passim; 1976.

7406 HYPERLIPIDAEMIA AND PANCREATITIS ASSOCIATED WITH ORAL CONTRACEPTIVE THERAPY. (Eng.). Mehrotra, T. N.; Dwivedi, K. K.; Singh, M. M.; Mittal, H. S.; Singh, V. S. (L.L.R.M. Medical Coll., Meerut, India). *J. Assoc. Physicians India* 23(2):161-164; 1975.

7407 MACROAMYLASEMIA: CLINICAL AND LABORATORY FEATURES IN 7 PATIENTS. (Eng.) Zeze, F.; Nakamura, K.; Yoshimori, M.; Ishii, K. (Dept. Serology, Natl. Cancer Center, Tsukiji 5-chome, Chuo-ku, 104, Japan). *Gastroenterol. Jpn.* 10(4):255-260; 1975.

7408 Giardia-INDUCED MALABSORPTION IN PANCREATITIS. (Eng.) Sheehy, T. W.; Holley, P. H., Jr. (Univ. Alabama Sch. Medicine, Birmingham, AL.) *JAMA* 233(13):1373-1375; 1975.

7409 PANCREATIC PSEUDOCYST AND POLYCYTHEMIA AFTER RENAL TRANSPLANTATION. (Eng.) Grace, D. M.; Stiller, C. R. (Univ. Hosp., 339 Windermere Rd., London, Ontario, Canada, N6G 2K3). *Can. J. Surg.* 18(5):444-445; 1975.

7410 PANCREATITIS OF UNUSUAL ORIGIN. (Eng.) Traverso, L. W.; Damus, P. S.; Longmire, W. P., Jr. (UCLA Sch. Medicine, Los Angeles, CA). *Surg. Gynecol. Obstet.* 141(3):383-386; 1975.

7411 CASE REPORTS. TRAUMATIC PANCREATITIS WITH PERIPHERAL FAT NECROSIS. (Eng.). Cochran, K. M.; Mason, J. R.; Davidson, J. S. H. (Ward 8C, Gartnaval General Hosp., 1053 Great Western Rd., Glasgow G12 OYN, Scotland). *Postgrad. Med. J.* 51(597):457- 460; 1975.

7412 ACUTE PANCREATITIS: A PREDICTABLE DISEASE. (Eng.) Romero, C.; Kraft, A. R.; Saletta, J. D.; Levine, H. D.; Moss, G. S. (Cook County Hosp., Chicago, IL). *Surg. Forum* 26:446-448; 1975.

7413 VARIATION IN ANNUAL INCIDENCE OF PRIMARY ACUTE PANCREATITIS IN NOTTINGHAM,1969-74. (Eng.) Bourke, J. B. (General Hosp., Nottingham, NG1 6HA, England). *Lancet* 2(7942):967-969; 1975.

7414 ACUTE PANCREATITIS. TEN YEARS EXPERIENCE IN THE WAIKATO DISTRICT. (Eng.) Opie, J. C. (Royal Melbourne Hosp., Victoria, Australia). *N.Z. Med. J.* 82(546):126-129; 1975.

7415 ACUTE PANCREATITIS (THE ROLE OF EARLY LAPAROTOMY IN ACUTE PANCREATITIS) [Abstract]. (Eng.) Murata, I. (Toyama Chuo Hosp., Toyama, Japan). *Gastroenterol. Jpn.* 10(3):241; 1975.

7416 HYPERALIMENTATION AND SURGICAL TREATMENT OF ACUTE PANCREATITIS [Abstract]. (Eng.) Saito, Y. (1st Dept. Surgery, Tohoku Univ., Sendai, Japan). *Gastroenterol. Jpn.* 10(3):240; 1975.

7417 AZATHIOPRINE IN THE TREATMENT OF ACUTE HEMORRHAGIC PANCREATITIS [Abstract]. (Eng.) Kerstein, M. D.; Grabman, J. P. (Veterans Admin. Hosp., West Haven, CT). *Clin. Res.* 23(5): 578A; 1975.

7418 TREATMENT OF ACUTE PANCREATITIS [Abstract]. (Eng.) Wakabayashi, T. (Tokyo Police Hosp., Tokyo, Japan). *Gastroenterol. Jpn.* 10(3): 240-241; 1975.

7419 TREATMENT OF ACUTE PANCREATITIS WITH SPECIAL REFERENCES TO PATHOGENESIS [Abstract]. (Eng.) Mizumoto, R. (Kyoto Univ. Medical Sch., Kyoto, Japan). *Gastroenterol. Jpn.* 10(3): 241-242; 1975.

7420 ROLE OF EMERGENCY LAPAROTOMY IN ACUTE PANCREATITIS. (Eng.) Grana, W.; Wise, L. (Washington Univ. Sch. Medicine, St. Louis, MO). *Am. Surg.* 42(2):128-134; 1976.

7421 CYCLIC AMP AS A DETERMINANT OF THE COURSE OF ACUTE ALCOHOLIC PANCREATITIS [Abstract]. (Eng.) Sehgal, L. R.; Kraft, A. R.; Romero, C.; Saletta, J. D. (Cook County Hosp., Chicago. IL). *Surg. Forum* 26:448-450; 1975.

7422 THE SIGNIFICANCE AND MANAGEMENT OF ARTERIAL HYPOXIA IN ACUTE PANCREATITIS [Abstract]. (Eng.) Imrie, C. W.; Ferguson, J. C.; Murphy, D.; Mackenzie, I.; Davidson, J. F.; Blumgart, L. H. (Glasgow Royal Infirmary, Glasgow, Scotland). *Gut* 17(5):386; 1976.

7423 TUMOR-INDUCED ACUTE PANCREATITIS. (Eng.) Niccolini, D. G.; Graham, J. H.; Banks, P. A. (St. Elizabeth's Hosp., Boston, MA). *Gastroenterology* 71(1):142-145; 1976.

PANCREAS

7424 MECHANISM OF THE ELEVATED RENAL CLEARANCE OF AMALASE: CLEARANCE OF CREATININE (C_{am}/C_{cr}) IN ACUTE PANCREATITIS [Abstract]. (Eng.) Johnson, S. G.; Ellis, C.; Spring, B.; Levitt, M. D. (Univ. Minnesota Hosp., Minneapolis, MN). *Clin. Res.* 24(3): 433A; 1976.

7425 HYPOCALCAEMIA OF ACUTE PANCREATITIS: THE EFFECT OF HYPOALBUMINAEMIA [Abstract]. (Eng.) Imrie, C. W.; Allam, B. F.; Ferguson, J. C.; Blumgart, L. H. (Glasgow Royal Infirmary, Glasgow, Scotland). *Gut* 17(5):386; 1976.

7426 INCREASED AMYLASE-CREATININE CLEARANCE RATIO IN ACUTE EXPERIMENTAL PANCREATITIS [Abstract]. (Eng.) Orda, R.; Orda, S.; Winznitzer, T.; Bawnik, J. B. (Ichilov Hosp., Tel-Aviv, Israel). *Clin. Res.* 23(5):578A; 1975.

See also, 6977, 7094, 7110, 7146, 7395.

LIVER AND BILIARY TRACT

7427 THE ENTEROHEPATIC CIRCULATION OF BILE ACIDS IN MAN. (Eng.) Hofmann, A. F. (Mayo Clinic, Rochester, MN 55901). *Wis. Med. J.* 75(5):J35-40; 1976.

The enterohepatic circulation of bile acids in man is reviewed. General topics covered include the chemistry and physiology of bile acids, methods for characterizing the enterohepatic circulation in man, chenic acid therapy in patients with gallstones, and the diagnostic use of bile acids. The observation that chenic acid administration to patients with gallstones decreases the cholesterol saturation level of their bile by transforming it from saturated or supersaturated to unsaturated has given rise to extensive clinical trials aimed at determining the efficacy and safety of chenic acid. Multiple small stones are much more responsive than large single stones to chenotherapy, not only because the latter have a lower surface to volume ratio, but also because the latter are older and often coated by calcium. Chenic acid appears capable of decreasing the cholesterol saturation level of the bile in most patients (perhaps more than 90%) when administered in sufficient amounts, and failure of gallstones to dissolve most often indicates that the stone is not a cholesterol stone or is coated with calcium. The only common side effects resulting from chenic acid therapy in about 5,000 patients have been transient, slight elevations in SGOT and SGPT, which frequently are self-limited, despite continuous treatment. Although the long-term future of chenotherapy is uncertain, it does appear to be the treatment of choice for patients with increased risk for cholecystectomy.

7428 DESFERRIOXAMINE B: REVERSIBLE SIDE EFFECTS OF HIGH DAILY DOSES. (Eng.) Cartei, G.; Barbui, T.; Cazzavillan, M.; Chisesi, T.; Dini, E. (Reparto di Ematologia, Ospedale Civile Regionale, 36100 Vicenza, Italy). *Blut* 31(1):11-16; 1975.

Possible side effects of large daily doses of deferoxamine (Desferrioxamine B; DF) in 16 patients with iron overload due to chronic liver and hematologic diseases were investigated. The daily doses that were given for 5 consecutive days ranged from 1 to 4 g. The first gram was given i.m., while supplementary amounts were administered by two i.v. slow infusions in saline. Doses of 1 and 2 g/day had no side effects, with the exception of a drop in the WBC count from 4,600-5,200 to 2,800 cells/mm^3 after 5 days of therapy in a 72-yr-old man with sideroblastic anemia. A dose of 3 g/day was given to 15 patients, and this was followed in four cases by some elevations in liver or kidney function tests. Urea was raised from 15-17 to 30 mg/100 ml in a 62-yr-old female, and creatinine was raised from 1.0-1.3 to 2.0 mg/100 ml in a 59-yr-old male. Serum alkaline phosphatase was raised from 35-43 to 60 mU/ml in a 67-yr-old female, and serum glutamyl-transpeptidase was increased from 90-120 to 218 mU/ml in a 37-yr-old male. Following the administration of 4 g/day of DF to a 76-yr-old male, creatinine, SGOT, and SGPT values were raised from 1.4-1.9 to 3.6 mg/100 ml, 12-20 to 96 mU/ml, and 9-20 to 96 mU/ml, resp. The same dose caused elevation in creatinine (0.4-0.8 to 1.5 mg/100 ml) and in serum alkaline phosphatase (50-60 to 87 mU/ml) in a 67-yr-old female. The same 4-g daily dose also caused an elevation in LDH (50-68 to 115 mU/ml) in a 38-yr-old male. WBC counts fell below the pretreatment range in three patients receiving daily doses of 3-g and in four patients receiving daily doses of 4-g. All of the above variations disappeared within 1 week following the reduction in the daily dosage to 1-g. It is suggested that the administration of doses of DF greater than 2-g/day should be avoided, at least in older patients. When large doses of DF are needed, as in acute iron poisoning, liver and kidney function, as well as the hematologic picture, should be carefully surveyed.

7429 A STUDY OF FACTORS INFLUENCING DRUG DISPOSITION IN CHRONIC LIVER DISEASE, USING THE MODEL DRUG (+)-PROPRANOLOL. (Eng.) Branch, R. A.; James, J.; Read, A. E. (Dept. Medicine, Univ. Bristol, Bristol BS8 1TD, England). *Br. J. Clin. Pharmacol.* 3(2):243-249; 1976.

Factors influencing drug disposition in chronic liver disease were studied in 6 normal controls and in 20 patients with stable chronic liver disease, following the i.v. administration of 40 mg of (+)-propranolol. There was a progressive increase in the half-life (T½) of (+)-propranolol from a mean of 2.9 hr in controls to 9.8 hr in patients with mild chronic liver disease and 22.7 hr in patients with severe chronic liver disease. This prolongation was associated with a twofold increase in the volume of distribution, a fourfold decrease in the clearance of (+)-propranolol, a decrease in serum albumin, an increase in serum bilirubin, and a prolongation in the prothrombin index (all of which were significantly correlated). In both the patients with liver disease and normal subjects, the clearance of (+)-propranolol correlated with the clearance of indocyanine green ($p<0.05$). Protein was reduced from 87.8% (mean value) in normal subjects to 82.3% ($p<0.05$) in patients with chronic liver disease, but this change was not related to changes in plasma proteins. In normal subjects and patients without ascites, the volume of distribution increased with decreases in protein binding. The five patients with ascites had a similar correlation, except that the volume of distribution was increased twofold for any degree of protein binding. The results indicate that chronic liver disease tends to influence the three major independent variables that determine the T½ of (+)-propranolol in such a way that increases in plasma protein pool size, decreases in protein binding, and decreases in clearance with all tend to prolong the T½.

7430 HEPATORENAL SYNDROME FOLLOWING HEMIHEPATECTOMY. (Eng.) Epstein, M.; Oster, J. R.; De Velasco, R. E. (Veterans Admin. Hosp., 1201 N.W. 16th Street, Miami, FL 33125). *Clin. Nephrol.* 5(3):128-133; 1976.

A case of hepatorenal syndrome (HRS) following right hemihepatectomy in a previously healthy 21-yr-old male patient who sustained a shotgun wound in the abdomen is reported. In spite of the development of severe oliguric renal insufficiency and the administration of 7 l of saline, albumin, and blood/day in excess of losses, along with the administration of furosemide, the urine sodium concentration (about 10 mEq/l) from the 4th postoperative day remained very low, thereby excluding the diagnosis of acute tubular necrosis. Although severe hyperbilirubinemia developed, the prothrombin time was only slightly abnormal, and the liver doubled in size within 2 weeks of surgery. The patient expired from a cardiac arrest during an emergency laparotomy on the 14th day after initial surgery. At autopsy, the kidneys were found to be enlarged, but without evidence of pre-existing chronic renal disease. Although the precise pathophysiological mechanism operating in this patient is not clear, an absence of severe hepatic failure militates against the concept of a circulating substance toxic to the kidney being the sole etiologic factor. Rather, the present case raises the possibility that an alteration of hemodynamics may participate in mediating the HRS.

7431 EFFECT OF BILE DUCT LIGATION ON THE ULTRASTRUCTURAL MORPHOLOGY OF HEPATOCYTES. (Eng.) Vial, J. D.; Simon, F. R.; Mackinnon, A. M. (Dept. Molecular, Cellular, and Developmental Biology, Univ. Colorado, Boulder, CO 80220). *Gastroenterology* 70(1):85-92; 1976.

The effect of severe cholestasis produced in male Sprague-Dawley rats by bile duct ligation of surface membrane ultrastructure was examined. In the hepatocytes of the rats with cholestasis, the intratrabecular surfaces were folded, and numerous structures, such as spherules and scattered finger-like processes, were present. The number and prominence of the laminar plicae expansions were increased, and they were generally flattened against the cell body. The lumina of the bile canaliculi were widened, and their course appeared more tortuous than that in controls. In the normal livers, the canaliculus was bounded on either margin by a marginal ridge along which a row of microvilli overhanging the lumen rose. A comparison of scanning electron microscopic and transmission electron microscopic images of normal livers with the livers of animals that underwent biliary duct ligation showed that among the villous population of one canaliculus, there appeared to be a special class formed by the villi implanted on the marginal ridge. The villi derived from the marginal ridge were unaltered after bile duct obstruction. In contrast to the hepatocytes of normal rats, the remainder of the canalicular surface in the hepatocytes of rats with bile duct ligation was devoid of microvilli. Newer techniques in tissue preparation and scanning electron microscopy demonstrate that bile canalicular microvilli are derived from two anatomical sites and respond differently to bile duct ligation.

7432 BILIARY LIPID EXCRETION AFTER HEPATIC PORTOENTEROSTOMY. (Eng.) Lilly, J. R.; Javitt, N. B. (Univ. Colorado Sch. Medicine, 4200 E. Ninth Ave., Denver, CO 80220). *Ann. Surg.* 184 (3):369-375; 1976.

Experience with 16 infants treated for biliary atresia by hepatic portoenterostomy employing an exteriorized Roux-en-Y intestinal segment is presented. The sequential biliary lipid content in the bile and serum after the operation was determined, and the biochemical studies were correlated with the clinical course of the infants following the operation. Eleven infants had sustained postoperative bile drainage, but four of these had progressive liver cirrhosis. In the seven patients with bile drainage and stable or improved hepatic function, the total serum bilirubin increased several mg/100 ml early in the postoperative period. Several weeks later, there was a gradual decline in serum values coincident with increased bile output, and the bilirubin levels reached normal 6-24 weeks after portoenterostomy. In these patients, the total serum bile acid dropped by over two-thirds in the first two postoperative months, and thereafter the decline was more gradual. The highest single preoperative level in these patients was 155 µg/ml, and the lowest postoperative value was 9 µg/ml. Preoperatively, the serum bile acid components were almost equally divided between cholate and chenodeoxycholate. The initial fall in total bile acid was largely due to the decrease in the cholate fraction; subsequently, the decline in the cholate and chenodeoxycholate fractions was about equal. In the bile, the total bile salt concentration was highest during the first months after operation, and the cholate fraction contributed most to bile salt excretion throughout the first postoperative year. A sharp decrease in the elevated serum cholesterol and phospholipid values was seen during the first months after operation, after which they fell gradually to normal or near normal levels by the ninth postoperative month. Bile cholesterol and phospholipids increased progressively during the first five postoperative months, correlating better with bilirubin excretion than with biliary bile salt concentrations. In the patients with bile drainage and cirrhosis, the preoperative and early postoperative values of serum and biliary bilirubin and bile lipids were not significantly different from those of the patients with improved liver function; preoperative serum bilirubin, cholesterol, phospholipid, and total bile acid levels declined during the first 1-2 months, but this trend was reversed between 2 and 3 months, and the serum bilirubin and lipid values subsequently increased beyond those recorded preoperatively. Bilirubin and biliary lipid levels in bile fell shortly before they increased in the serum. The results suggest that both obstructive and parenchymal factors are operative in infants with biliary atresia.

7433 THE DIAGNOSTIC VALUE OF SOME SERUM ENZYMES IN LIVER DISEASE.

(Eng.) Straub, J. P. (Dept. Internal Medicine, Free Univ. Hosp., Amsterdam, Netherlands). *Neth. J. Med.* 18(6):273-278; 1975.

The activities of several serum enzymes were determined in 121 patients with diseases of the liver and bile duct system in order to ascertain their diagnostic value. The enzymes studied included isocitrate dehydrogenase (ICDH), glutamate dehydrogenase (GDH), cholinesterase (CE), SGOT, SGPT, LDH, and alkaline phosphatase (AP). Three patient groups were identified: those with parenchymal damage of the liver (32 acute hepatitis, 15 chronic aggressive or persistent hepatitis, and 18 cirrhosis), 24 with extrahepatic biliary obstruction without evidence of metastases, and 32 with proved liver metastases. The contribution of enzyme determination to the differential diagnosis of liver disease was found to be comparatively small. The mean enzyme-activity values confirmed published results, but there was a considerable overlap of individual results in most groups, and any meaningful statistical analysis was precluded. Combinations of determinations were sometimes useful. A low CE activity with increased LDH activity pointed to malignant disease of the liver. The ICDH level was of little value when SGPT was also determined. In most cases of liver metastases, the SGOT:SGPT ratio was not greater than 1 (contrary to general opinion), and the (SGOT + SGPT):GDH ratio did not discriminate between the acute and chronic forms of liver disease. None of the enzyme activities differentiated between cirrhosis and chronic hepatitis.

7434 ANTIBODIES TO Escherichia coli IN CHRONIC LIVER DISEASES.

(Eng.) Simjee, A. E.; Hamilton-Miller, J. M. T.; Thomas, H. C.; Brumfitt, W.; Sherlock, S. (King Edward VIIIth Hosp., Natal, South Africa). *Gut* 16(11):871-875; 1975.

Individual antibodies to a large group of specific *Escherichia coli* O serotypes were sought in 12 patients with chronic active hepatitis, 6 patients with alcoholic cirrhosis, 9 patients with primary biliary cirrhosis, 8 patients with cryptogenic cirrhosis, 8 patients with portacaval shunt, and 9 normal controls. In addition, the immunoglobulin class of the antibodies was investigated to determine whether these antibodies contribute to the altered immunoglobulin concentrations found in patients with liver disease. The patients with chronic active hepatitis and those with alcoholic cirrhosis had a greater number of specific *E. coli* antibodies than did any of the other groups separately. One patient with chronic active hepatitis had 35 of 150 positive reactions, and one patient with alcoholic cirrhosis had over 25 positive reactions; in contrast, the number of positive reactions in the other groups did not exceed 10 in any patient. There was no correlation between the number of antibodies and the levels of immunoglobulins, either individually (IgG, IgA, or IgM) or in sum. In three of the patients in whom antibodies to a large number of serotypes were found, immunoglobulin classification was attempted by means of 2-mercaptoethanol treatment of the serum. The antibodies in these patients were predominantly of the IgM class, while the elevation of globulin in general was mainly due to increased IgG and IgA levels. Antibodies to *E. coli*, therefore, probably contribute only a small part of the increased globulin levels found in patients with chronic liver disease.

7435 THE HEMODYNAMICS OF DIFFUSE LIVER DISEASES.

(Eng.) Viamonte, M., Jr.; LePage, J. R.; Russell, E.; Roen, S. A.; Pereiras, R.; Zeppa, R.; Viamonte, M. (Dept. Radiology, Univ. Miami Sch. Medicine, Miami, FL 33136). *Semin. Roentgenol.* 10(3):187-196; 1975.

The effects of various liver diseases on the hemodynamics of the liver are reviewed. Two inflow tracts (the hepatic artery and the portal vein) and three outflow tracts (the hepatic veins, the biliary ducts, and the lymphatics) serve the liver in circulating blood, lymph, and bile. Cirrhosis of the liver is the pathologic end result of various noxious agents that affect that organ. Often in cirrhosis, there is an increase in the ratio of arterial to venous inflow resulting from various factors. Unduly frequent communication is seen between the portal and hepatic veins. Gastrointestinal hemorrhage is the most common complication and cause of death in hepatic cirrhosis with portal hypertension. It must be treated according to the activity and severity of liver damage and to the type and severity of the altered hemodynamics. Techniques for assessing the hepatic vascular physiology include wedged hepatic vein and free hepatic vein manometry, wedged hepatic venography, manometry along the inferior vena cava, and selective left renal venography, all of which can be performed consecutively. Selective splenic and hepatic arteriography also provide useful information. In patients with active bleeding, selective arterial infusion of vasopressin, or embolization of the supplying artery or the veins in the gastroesophageal region may help in stopping the bleeding.

7436 FIBROSIS IN CHRONIC LIVER DISEASE. (Eng.)

Popper, H.; Kent, G. (No affiliation given). *Clin. Gastroenterol.* 4(2):315-322; 1975.

The pathogenesis, diagnosis, and therapy of hepatic fibrosis are reviewed. The pattern of fibrosis is important in classifying cirrhosis and in differentiating it from chronic hepatitis and noncirrhotic hepatic fibrosis. The pathological picture of fibrosis characteristic for cirrhosis is described, as is that characteristic for chronic hepatitis and several noncirrhotic fibrotic conditions: hepatoportal sclerosis, congenital fibrosis, hepatic fibrosis with portal hypertension on an infectious basis, granulomatosis, and precirrhotic stages of portal fibrosis. The development of normal hepatic connective tissue is briefly reviewed, and the morphogenesis of several types of hepatic fibrosis is discussed. Fibrosis may result from parenchymal collapse, either bridging collapse or massive collapse. Active parenchymal fibroplasia may occur around damaged hepatocytes, proliferated bile ductules, capillaries, and macrophages containing phagocytosed material. Septa may be active or passive. Sustained injury of the hepatocytes is the most common event stimulating fibrosis. Phases of fibroplasia include the commitment of the cells to fibroplasia, formation of intracellular collagen, and extracellular maturation and deposition of collagen. The biochemical breakdown of connective tissue is discussed. Rational therapy for established hepatic fibrosis does not exist, and therapeutic measures are aimed rather at prevention. Anti-inflammatory therapy has been the most effective, but it is still only symptomatic.

7437 LIVER FUNCTION IN SURVIVORS OF THE ATOMIC BOMB. (Eng.)

Gregory, P. B.; Amamoto, K.; Archer, P. G.; Rickert, E. R.; Omori, Y.; Bizzozero, O. J., Jr.; Hamilton, H. B.; Johnson, K. G. (Atomic Bomb Casualty Commission, Hijiyama Park, Hiroshima, Japan). *Radiat. Res.* 63(3):578-583; 1975.

Screening liver function tests were obtained from 1,128 male and 1,867 female atomic bomb survivors and from matched, nonexposed controls. A total of 234 subjects (7.8%) had one or more test results greater than two standard deviations from the mean. Among these patients, the deviate test result was the cephalin-cholesterol flocculation test in 121 subjects, the alkaline phosphatase test in 53 subjects, the SGPT test in 36 subjects, and multiple tests in 24 subjects. When atomic bomb exposure on an age-, sex-, and city-specific basis, using distance from the hypocenter and reported presence or absence of acute radiation symptoms at the time of the bombing as the criteria for exposure, was correlated with each of the three liver function tests separately, as well as for all three tests combined, no detectable influence of exposure to ionizing radiation on the test results was found. Follow-up examinations of 172 of the 234 subjects with liver function test values greater than two standard deviations from the mean were conducted 2 months after initial testing, and diagnoses of hepatobiliary disease were equally divided among exposed and nonexposed subjects. Exposure to the atomic bomb does not appear to have resulted in long-term susceptibility to hepatic disease.

7438 ASPARTYLGLUCOSAMINURIA: UNIQUE BIOCHEMICAL AND ULTRASTRUCTURAL CHARACTERISTICS. (Eng.)

Isenberg, J. N.; Sharp, H. L. (Univ. California, Los Angeles, Sch. Medicine, Los Angeles, CA). *Hum. Pathol.* 7(4):469-481; 1976.

The case report and the biochemical and ultrastructural findings of the first diagnosed case of aspartylglucosaminuria in the United States are presented. The patient, a 2-yr-old girl, was first examined because of hepatosplenomegaly, mitral insufficiency, and mild psychomotor retardation. She had coarse facial features, an umbilical defect, and elastic joints. Roentgenograms demonstrated cortical thinning and an increased trabecular pattern in the long bones. No ophthalmologic abnormalities were present. Peripheral blood and bone marrow examinations showed vacuolated lymphocytes containing material that did not stain with Best-carmine or PAS reagents. Electron microscopy revealed enlarged lysosomes containing a fine granular matrix, suggesting a glycoprotein storage disease. Examination of the urine excluded mucopolysaccharidosis as a diagnosis. When the patient's urine and aspartylglucosamine (AADG) were analyzed together chromatographically, only a single spot was noted. When lysosomal hydrolase activities were compared in WBC homogenates from the patient and from controls, the mean level of AADGase activity in the homogenates of the controls was 8.1 nmol/hr/mg protein, while there was no net release of hexosamine in the patient. The level of N-acetyl-β-glucosaminidase in the patient (4,702.9 nmol/hr/mg) was elevated in comparison to that in controls (2,682.1 nmol/hr/mg), while the levels of α-L-fucosidase, α-mannosidase, and β-galactosidase in the patient were in the upper part of the control range. The ultrastructural findings in this patient differed from other reported cases of aspartylglucosaminuria in that no abnormalities were found in the endoplasmic reticulum, Golgi apparatus, or glycogen content of the liver.

7439 DIFFERENTIATION OF BILIARY ATRESIA FROM NEONATAL HEPATITIS BY ROUTINE CLINICAL EXAMINATIONS. (Eng.)

Chiba, T.; Kasai, M. (Second Dept. Surgery, Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 115(4):327-335; 1975.

The differential diagnosis of neonatal hepatitis (33 patients), and congenital biliary atresia (90 patients) was studied on the basis of routine clinical examinations. The diagnosis of neonatal hepatitis was confirmed by surgical exploration, liver biopsy, and/or clinical examinations. Total serum cholesterol ranged from 150 to 350 mg/100 ml in almost all cases of neonatal hepatitis, compared to values of more than 350 mg/100 ml in 30% of patients with biliary atresia. There was no case of neonatal hepatitis in which serum phospholipids rose over 350 mg/100 ml, compared to several cases of biliary atresia with values over this limit. Cases with more than 19% relative content of α-globulin in total serum protein were indicative of biliary atresia, while those with less than 10% α-globulin suggested neonatal hepatitis. Many cases of neonatal hepatitis showed more than 10% γ-globulin, compared to values lower than 10% in biliary atresia. Cases of biliary atresia usually showed total serum bilirubin values over 10 mg/100 ml, but these values were below 10 mg/100 ml in one-half the cases of neonatal hepatitis. All patients with neonatal hepatitis had serum alkaline phosphatase values below 25 King-Armstrong U, while most patients with biliary atresia showed values over this limit. It was stressed that the differentiation between the two diseases be made as early in life as possible, since the most favorable therapeutic results with congenital biliary atresia are obtained before 10 weeks of age.

7440 ROLE OF LIVER SCANNING IN THE DIAGNOSIS OF HEPATIC METASTASES.

(Eng.) Hatfield, P. M. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *Med. Clin. North Am.* 59(2):247-276; 1975.

The role of liver scanning in the diagnosis of hepatic metastases is discussed in light of experience with 90 patients. Most often, scanning was done to determine metastases not clinically proven, to evaluate known metastases, to explain abnormal liver chemistries in the absence of an enlarged liver, to evaluate an enlarged liver in the absence of malignancy and cirrhosis, and to rule out causes other than cirrhosis for hepatomegaly or abnormal liver chemistries in suspected cirrhosis cases. Scanning was 79% accurate in differentiating benign liver conditions from hepatic neoplasms in 48 proved cases and 89% accurate when unproved cases were included. Subsequently proved hepatic metastases were demonstrated by scanning in 20% of 30 patients with unexplained hepatomegaly and no known malignancy, in 3% of 32 patients with abnormal liver chemistries and a liver of normal size, and in 4% of 28 patients with a clinical diagnosis of cirrhosis. Among 29 patients with subsequently proved metastases and normal liver function tests, 15% were shown by scanning. In only 1/29 was a normal scan associated with proved metastases. Although scanning is more specific than any combination of currently available liver function tests, a high false-positive response rate (10/39 in this series) is a distinct disadvantage. The false-positive rate was reduced to 17% when the 19 truly positive scans for liver metastases in those patients with known liver metastases were included and to 13% when the 22 unproved patients with a scan diagnosis of hepatic metastases were included.

7441 SUBTRACTION SCANNING OF LIVER METASTASES WITH ^{67}Ga and ^{99m}Tc.

(Eng.) Erjavec, M.; Movrin, T.; Snajder, J. (Inst. Oncology, 4 Vrazov trg, 61000 Ljubljana, Yugoslavia). *J. Nucl. Biol. Med.* 19(2):53-57; 1975.

A method of subtraction scanning using an off-line, computer assisted, dual-analyzer scintigraphic method is described. ^{99m}Tc colloid was used to label the liver tissue and ^{67}Ga citrate was used to label both liver and neoplasm. Subtraction of simultaneously recorded counts gave positive images over structures concentrating more gallium than colloid. Conventional liver scintigrams with radiocolloids indicated the correct condition of the liver in 53/86 cases. There were 8/44 false positives, 8/42 false negatives, and in 17 the scintigram was equivocal. The subtraction image allowed a correct assessment in 85/94 cases. There were four false negatives: two cases of large metastases (malignant neurinoma and colon adenocarcinoma), one case of metastatic breast carcinoma of $\sim$1 cm subsequently revealed at surgery, and one case of metastasis of a breast carcinoma involving the left lobe erroneously considered "normal median radioactivity." Six false positives included three cases of a slightly positive image probably due to statistical variation; two cases of positive small islands over the lower part of the liver, probably due to ill-cleansed bowels; and one case of Hodgkin's disease with a clearly positive subtraction image but negative findings upon laparoscopy. The latter may well have been a false-negative laparoscopy rather tha a false-positive scan. A relatively slight uptake of ^{67}Ga was found in six cases (two rectal, two breast, one gastric, and one lung carcinoma), but subtraction scanning afforded the correct diagnosis. The most impressive images were observed in cases of malignant lymphomas and other fast-growing tumors. In nine cases, the subtraction image defined disease located in the liver area (celiac, portal, and perisplenic nodes), but outside the liver itself. The advantages of this technique over conventional liver scanning are discussed.

7442 DEMONSTRATION OF GROWING CASTS OF HEPATOCELLULAR CARCINOMA IN THE PORTAL VEIN BY CELIAC ANGIOGRAPHY: THE THREAD AND STREAKS SIGN.

(Eng.) Okuda, K.; Musha, H.; Yoshida, T.; Kanda, Y.; Yamazaki, T.; Jinnouchi, S.; Moriyama, M.; Kawaguchi, S.; Kubo, Y.; Shimokawa, Y.; Kojiro, M.; Kuratomi, S.; Sakamoto, K.; Nakashima, T. (First Dept. Medicine, Chiba Univ. Hosp., Chiba 280. Japan). *Radiology* 117 (2):303-309; 1975.

Of 112 patients with hepatocellular carcinoma examined by selective celiac and hepatic angiography, 28 demonstrated regurgitation of the contrast medium into one of the large portal branches. Visualization of small intrahepatic portal branches was more frequently observed, and in nine, the "thread and streaks" sign, suggestive of tumor casts, was seen. This sign appeared shortly after the start of the injection and was most clearly seen at 3-3.5 sec. In four, the cast appeared to fill the entire length of the right portal vein, and in the other five, the cast was limited to a short distance in one of the major portal branches.

The majority of these patients had clinical signs of portal hypertension. The tumor cast was confirmed by autopsy in five of the nine. Among 115 autopsies for hepatocellular carcinoma, visible tumor growth in the large portal branches was observed in 83. Radiography of the excised livers disclosed that the contrast medium injected into the hepatic artery entered the tumor cast and ran hepatofugally to meet the portal blood near the hilus. Four cases are summarized, and several illustrative angiograms are included. The clinical significance of the "thread and streaks" sign is that the lobe containing a tumor cast in its major portal branch is supplied solely by the hepatic artery. If the right portal branch is involved, portal hypertension is inevitable, often leading to fatal complications.

7443 PRIMARY LIVER CARCINOMA—CLINICAL PICTURE AND DIAGNOSTIC POSSIBILITIES. A REVIEW OF SEVENTY-FIVE CASES. (Eng.) Kordac, V.; Kalab, M. (1st Medical Dept., Faculty General Medicine, Charles Univ., Unemocnice 2, 128 08 Prague, Czechoslovakia). *Acta Hepatogastroenterol. (Stuttg.)* 23(3):186-193; 1976.

The clinical findings in 75 patients (65 men) with pirmary liver carcinoma (PLC) are presented. The diagnosis was established in most patients during the sixth decade of life; the average age at death was 59.6 yr. A history of alcoholism was found in 19.4% of the patients, of smoking in 41.1%, of acute viral hepatitis in 21.3%, of porphyria cutanea tarda (symptomatic liver porphyria) in 16.0%, and of diabetes mellitus in 16.0%. PLC was associated wiht cirrhosis in 88.6% of the cases. The percentage of PLC cases associated with cirrhosis during 1951-1963 was lower than during 1963-1975. Most patients died 24 weeks (range 7-65 weeks) following the appearance of the first symptoms: pain, hepatomegaly, palpable tumor, weight loss, and fever. The correct diagnosis was made by laparoscopy in 25% of the 30 patients in whom it was performed. Liver biopsy, performed in conjunction with the laparoscopy in 15 of these patients, resulted in the correct diagnosis in 50%. Percutaneous liver biopsy alone facilitated the correct diagnosis in only 16.7% of 16 patients. Scintigraphic techniques and roentgenographic examination contributed toward the diagnosis in 31% and 36% of patients, resp. High alpha$_1$-fetoprotein levels (>3000 ng/ml) were found in the sera of 10 of 18 patients with PLC and cirrhosis. The most frequent cause of death in the 75 patients was liver coma (41.4%), and a further 8.0% of the patients died in liver coma following bleeding from esophageal varices. Bleeding from esophageal varices alone was the cause of death in 13.3% of the patients, and 21.3% died from Kachexia tumorosa. Of the 75 patients, 61.3% had no extrahepatic mestastases. Overall, agreement of clinical diagnosis and pathologic-anatomical diagnosis was found in 70.6% of the cases.

7444 TREATMENT OF PRIMARY LIVER CARCINOMA. (Eng.) Plengvanit, U.; Viranuvatti, V.; Chearanai, O. (Dept. Medicine, Siriraj Hosp., Mahidol Univ., Bangkok, Thailand). *Med. Chir. Dig.* 3(5):301-306; 1975.

The results of various methods of treatment were studied in 291 patients with primary liver cancer with or without cirrhosis. Of 109 patients treated by systemic chemotherapy with NH_2 and prednisolone, 73 also had cirrhosis. The carcinoma cell type was hepatoma in 89, cholangioma in 16, and undifferentiated in 4. Marked alleviation or disappearance of pain was seen after therapy in 65 of 103 patients (64%). A post-treatment reduction in size of the tumor was seen in 20%, and a reduction in consistency of the tumor was seen in 18%; in 19%, both parameters were reduced. Among the 103 patients, 26 patients (24%) experienced a 2-month remission of disease. Intra-arterial chemotherapy with NH_2 and prednisolone was used to treat 60 patients, of whom 32 had cirrhosis. The carcinoma cell type was hepatoma in 47, cholangioma in 4, and undifferentiated in 9 patients. Of 52 patients with pain before treatment, 38 (73%) had marked alleviation or disappearance of symptoms after therapy. Tumor size was reduced in 18 patients (30%), tumor consistency was reduced in 21 (35%), and both were reduced in 11 patients (18%). Of these 60 patients, 28 (47%) had a 2-month remission. Radiotherapy was used to treat 32 patients, of whom 25 had cirrhosis. Of these, 29 had hepatoma and 3 had cholangioma. The pain was alleviated or disappeared in 12 (40%) of 30 cases. A reduction in tumor size was seen in 15 cases (47%), in tumor consistency in 11 (35%), and in both, in 7 (22%). Of these 32 patients, 9 (28%) experienced a 2-month remission. Hepatic artery ligation was performed in 90 patients, of whom 23 had cirrhosis. There was an operative mortality of 10%. The diagnosis was hepatoma in 59, cholangioma in 24 and undifferentiated cell carcinoma in 7. Pain was alleviated or disappeared in 40 of 82 cases (50%) after surgery. Tumor size and tumor consistency were each reduced in 17 patients (19%) and both were reduced in 16 (18%). Of these patients, 31 (35%) had a 2-month remission. The results of treatment cannot be compared since the associated cirrhosis was different in each group.

7445 HEPATOCELLULAR CARCINOMA: A CLINICAL STUDY. (Eng.) Kirkpatrick, P. M., Jr.; Webster, P. D., III. (Dept. Medicine, Medical Coll. Georgia, Augusta, GA). *South. Med. J.* 68(12):1489-1493; 1975.

The clinical course of 40 patients (8 months to 85 yr, men outnumbering women by a 3:1 ratio) with histologically proved hepatocellular carcinoma was reviewed. Cirrhosis was present in 17/25 patients in which there was sufficient tissue in the biopsy specimen to make a determination. Symptoms (notably, abdominal pain, swelling, and mass) were present for an average of 4.8 months before diagnosis was established. Hepatomegaly, abdominal mass, weight loss, tenderness in the right upper quadrant, fever, and ascites were common physical findings upon admission to the hospital. The average hemoglobin and hematocrit values were 12.5 g/100 ml and 30%, resp. The WBC count on admission was greater than 12,000/mm^3 in eight patients. The serum alkaline phosphatase level was elevated in 30 patients, and SGOT level was elevated in 26. BSP excretion was delayed in 32 of the patients. A liver scan performed in 25 patients was abnormal in all instances. Determination of BSP excretion and alkaline phosphatase levels and the liver scan were the most useful diagnostic tests. The prothrombin time and bilirubin levels were normal or slightly elevated. Surgical exploration was done in 10 of the cases, but resection was attempted in only 2. Only four patients were alive 6 months after admission.

7446 HEPATOCYTIC HAMARTOMA (FOCAL NODULAR HYPERPLASIA OF THE LIVER): ANGIOGRAPHIC ASPECTS. (Eng.) Piffaretti, P. G.; Mosimann, R.; Roffi, V.; Chapuis, G. (Via Losanna 5, CH-6900 Lugano, Switzerland). *Radiol. Clin. Biol.* 45(1):1-8; 1976.

The case of a 24-yr-old woman with hepatocytic hamartoma is presented, and the angiographic findings are emphasized. The patient presented with right upper quadrant pain, and a firm ovoid mass was palpated under the right costal margin. An angiographic study demonstrated dilatation of the common hepatic artery, compared to the gastroduodenal artery, and of the hepatic artery proper. After the lobar bifurcation, one of the branches of the right hepatic artery followed a curved course around the upper part of the mass, and its lumen narrowed abruptly. The mass was vascularized by branches from this artery. The tumor appeared dense and homogenous and lobulated. There were no arteriovenous shunts or vascular lakes. The radiological diagnosis was hepatic adenoma or focal nodular hyperplasia. An encapsulated, 6 x 5 x 4-cm mass was removed. Microscopically, the tumor was fibrotic, with bundles of biliary ducts and chronic inflammatory cell infiltrates. The angiographic features in this patient appear to be identical to those of hepatocytic adenoma and of several cases of focal nodular hyperplasia described in the literature.

7447 SIGNIFICANCE OF SERUM LIPOPROTEID-X (LP-X) DETERMINATION FOR THE DIAGNOSIS OF CHOLESTASIS IN CHRONIC LIVER DISEASES. (Eng.) Milewski, B.; Palynyczko, Z. (Klinika Gastroenterologii, ul. Goszczynskiego 1, 02-616, Warsaw, Poland). *Pol. Med. Sci. Hist. Bull.* 15/3(5/6):551-555; 1975.

The value of serum lipoproteid-X (LP-X) determination for the diagnosis of cholestasis was investigated in 179 patients who had various chronic liver diseases. Histological evidence of intrahepatic cholestasis was found in 20 patients, and in all of these, LP-X was present in the serum. Among the 159 patients without histological evidence of cholestasis, LP-X in the serum was demonstrated in only 2 cases (both with chronic active hepatitis). A comparison of the LP-X test with other biochemical tests revealed that LP-X is of greater diagnostic significance for intrahepatic cholestasis than the determination of serum alkaline phosphatase, gamma-glutamyltranspeptidase, leucinaminopeptidase, and cholesterol. It is concluded that LP-X is a specific and sensitive biochemical index of cholestasis.

7448 FAMILIAL BENIGN RECURRENT INTRAHEPATIC CHOLESTASIS: INTERRELATION WITH INTRAHEPATIC CHOLESTASIS OF PREGNANCY AND FROM ORAL CONTRACEPTIVES? (Eng.) De Pagter, A. G. F.; van Berge Henegouwen, G. P.; ten Bokkel Huinink, J. A.; Brandt, K.-H. (Burg. van Engelenweg 124, IJsselmuiden, Netherlands). *Gastroenterology* 71(2):202-207; 1976.

Benign recurrent intrahepatic cholestasis was found in three members of a single family, and probably in a fourth. The cases of these four patients are presented. Needle liver biopsy in patient A, a girl who since the age of 18 months had had eight episodes of obstructive jaundice, showed cholestasis, which was not accompanied by any other changes. A pure bilirubin stone was removed from the gallbladder, at which time a peroperative cholangiogram showed no abnormalities. A second needle biopsy taken when the patient was asymptomatic showed a normal histology. Patient B, the sister of patient A, had recurrent episodes of extreme restiveness, pruritus, and discolored stools during the first year of life; there was no manifest jaundice. Later, she developed episodes of obstructive jaundice, which often occurred during or after a virus infection. During three pruritic phases, the only sign of cholestasis was moderately increased alkaline phosphatase activity; extremely high serum bile acid levels were found. Patient C, the cousin of the father of patients A and B, had had episodes of pruritus and jaundice since she was 14 days old. Since her second year of life, she had had six phases of obstructive jaundice. A cholecystoduodenostomy was established, from which cholangitis resulted at least once. During pregnancy, the patient developed pruritus and right upper abdominal pain; the cholecystogram revealed a stone, and cholecystectomy was performed. The patient developed persistent jaundice by the second postoperative day. The jaundice disappeared after a drain had been left in the common bile duct for 8 months. When the jaundice recurred 3 yr later, needle biopsy revealed intrahepatic cholestasis. For approximately 42 months, the patient received 20 g of cholestyramine daily. Patient D, the brother of patient C, had one icteric episode at the age of 6 yr, but did not develop another episode of jaundice (obstructive) until age 30 yr, following an episode of tonsillitis. Cholecystography after normalization of liver functions revealed no abnormalities. Needle biopsy disclosed no abnormality other than cholestasis. A normal bile acid level was found after normalization of the liver functions. Among 10 other family members (all women), pruritus without jaundice occurred in pregnancy in 6, pruritus with jaundice during pregnancy in 2, and pruritus during the use of oral contraceptives in 2. A literature review revealed at least 57 cases of benign recurrent intrahepatic cholestasis since 1959, and a familial form was fairly common. There also seemed to be a relation to the intrahepatic cholestasis sometimes seen during pregnancy and during oral contraceptive use. The data of the family study suggest an inter-relation of the three types of intrahepatic cholestasis.

7449 BILE ACID GLUCURONIDES, II. ISOLATION AND IDENTIFICATION OF A CHENODEOXYCHOLIC ACID GLUCURONIDE FROM HUMAN PLASMA IN INTRAHEPATIC CHOLESTASIS. (Eng.) Back, P. (Medizinische Universitatsklinik, Hugstetter Strasse 55, D-7800 Freiburg, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 357(2):213-217; 1976.

A bile acid glucuronide from the plasma of a patient with chronic intrahepatic cholestasis was isolated and identified chemically. The identification was based on the thin-layer chromatographic properties of the peracetylated methyl ester of chenodeoxycholic acid glucuronate, which could be separated from the methyl-ester polyacetates of other bile acid glucuronates. The compound isolated from the plasma showed typical (according to mass spectrometry) fragments for the sugar and bile acid moiety. The relative intensities of the fragments at m/e 371 (41%) and m/e 317 (100%) obtained at a source temperature of 206 C corresponded closely to those of the synthetic methyl 7α-acetoxy-3α-*O*-(methyl-2,3,4-tri-*O*-acetyl-β-D-glucopyranosyluronate)-5β-cholan-24-oate, m/e 371 (41%) and m/e 317 (100%) observed at a source temperature of 227 C. From considerations of the steric accessibility and higher reactivity of the C-3-hydroxyl group for substitution reactions, it is concluded that the synthesized reference compound is a chenodeoxycholic acid-3-β-D-glucuronide.

7450 ACUTE LIVER DISEASE AND ENCEPHALOPATHY MIMICKING REYE SYNDROME: A REPORT OF THREE CASES. (Eng.) Gall, D. G.; Cutz, E.; McClung, H. J.; Greenberg, M. L. (Hosp. Sick Children, 555 University Ave., Toronto M5G 1X8, Ontario, Canada) *J. Pediatr.* 87(6, pt. 1):869-874; 1975.

Three cases are described in which the clinical presentation and initial laboratory investigations suggested Reye's syndrome but in which subsequent clinical and biochemical evolution of the illness differed from that of Reye's syndrome. The patients were a 6-yr-old boy, a 4-yr-old girl, and a 23-month-old boy. All patients had a recent uncomplicated upper respiratory infection for which they had been briefly treated with erythromycin, phenylephrine-hydrocodone, or tetracycline, resp. All were found unconscious; patients 1 and 2 were in stage III coma, and patient 3 was in stage II coma when they were hospitalized. Unusual findings for Reye's syndrome included: absence of vomiting prior to the onset of encephalopathy; the sudden onset of coma without preceding delirium; slow recovery of consciousness, with severe neurologic sequela occurring in two children; severe renal impairment; normal pre-beta fraction on lipoprotein electrophoresis; decreased levels of β-1-C globulin; and normal blood ammonia levels in patients 2 and 3. The light microscopic histologic changes in liver biopsies from these patients differed in many aspects from those described in Reye's syndrome. The main insult affected the centrilobular hepatocytes, which showed coagulative necrosis; in Reye's syndrome, there is small droplet fatty change without necrosis. Unlike Reye's syndrome, the fatty change was focal and confined to the injured hepatocytes surrounding the necrotic areas, suggesting a degenerative rather than a primary phenomenon. Histopathologic findings similar to Reye's syndrome were a lack of portal inflammation and a return to normal within a short time after the acute insult, which was shown by a follow up biopsy 4 months later in patient 1. In the first two patients, electron microscopy revealed a conspicuous absence of glycogen, which was accompanied by an increase in smooth endoplasmic reticulum. The mitochondria showed decreased numbers of cristae and dense bodies, and the matrix contained occasional dense floccular deposits. These biopsies were taken within the first 24 hr of admission, while that in patient 3 was taken 10 days later; the smooth endoplasmic reticulum was prominent in this patient, but glycogen particles were present. The mitochondria were normal, and this case probably represents the early stages of recovery. The authors believe that these patients had a previously unrecognized disorder with multiple organ involvement, including the brain, liver, kidneys, and possibly the pancreas.

7451 ACUTE LIPOGRANULOMATOUS HEPATITIS. (Eng.) Haber, I.; Buyssens, N. (Dept. Internal Medicine, Algemeen Ziekenhuis Middelheim, Antwerp, Belgium). *Tijdschr. Gastroenterol.* 18(2):85-99; 1975.

A case of massive epithelioid- and giant cell lipogranulomatosis of the liver, accompanied by an acute self-limited febrile hepatocellular jaundice, is reported. A second case of epithelioid and giant cell lipogranulomatosis (in viral hepatitis) is presented to illustrate possible pathogenetic mechanisms. The first patient, a 34-yr-old man with alcoholic liver damage, presented with fever, fatigue, diffuse muscle pain, tachycardia, dark urine, and discolored feces. Although the patient was icteric, there were no signs of alcoholic liver disease. A percutaneous liver biopsy revealed numerous lipogranulomas throughout the lobule, but never within the portal tracts. The larger lipogranulomas showed multinucleated giant cells with palisading of the nuclei, and all transition stages of swollen epithelioid cells to giant cells were present. The portal tracts showed a variable lymphocytic infiltrate. The patient's symptoms disappeared spontaneously in 1 week. A second liver biopsy 6 weeks later showed that the granulomas had disappeared. Some portal tracts showed minor lymphocytic infiltration, while others were normal. Groups of swollen Kupffer cells filled with brown pigment and local accumulations of lymphocytes and plasmocytes were present in the sinusoids. The hepatocytes showed a moderate diffuse steatosis. The diagnosis was minimal granulomatous hepatitis, characterized by the presence of isolated giant cells, moderate steatosis, and the sequelae of hepatocellular damage. The patient stopped drinking and remains in good health. This patient was unusual in that the lipogranulomas were large and numerous, contained giant cells, and were associated with clinical symptoms. The authors propose two possible explanations for this: granulomas, arising in any granulomatous hepatitis associated with fatty liver, might sometimes accumulate preferentially around fat vacuoles and become lipogranulomas or small lipogranulomas that often exist in a steatotic liver may become exceptionally large and florid in response to concommitant viral hepatitis. These hypotheses are supported by the existence of a second patient with lipogranulomatosis. Percutaneous liver biopsy in this patient, a 35-yr-old man with viral hepatitis and no history of alcoholism, revealed five granulomas centered around lipid vacuoles; they were composed of epithelioid cells that fused to form multinucleate giant cells. Inflammatory infiltrates composed of lymphcytes, plasmocytes, and other mononuclear cells occurred in portal tracts and in sinusoids. Massive epithelioid- and giant cell lipogranulomatosis of the liver accompanied by an acute self-limited febrile hepatocellular jaundice remains a rare clinopathological entity.

7452 PORTAL HYPERTENSION IN INFANTS AND CHILDREN WITH HISTIOCYTOSIS X.

(Eng.) Grosfeld, J. L.; Fitzgerald, J. F.; Wagner, V. M.; Newton, W. A.; Baehner, R. L. (James Whitcomb Riley Hosp. Children, 1100 W. Michigan St., Indianapolis, IN 46202). *Am. J. Surg.* 131(1):108-113; 1976.

The cases of three children with histiocytosis X in whom cirrhosis, portal hypertension, and bleeding varices developed despite a good response to chemotherapy are presented. In all patients, hepatosplenomegaly, jaundice, and ascites were seen clinically, and liver biopsy following treatment showed cirrhosis with wide interportal fibrous bands and fine septa dividing the parenchyma into pseudolobules. The first patient, a 13-month-old boy, was treated for disseminated histiocytosis with x-ray therapy (1,000 rads) and monthly cycles of prednisone, methotrexate, cyclophosphamide, and vinblastine sulfate. Persistent hepatosplenomegaly led to readmission at 25 months. Although there was no evidence of active histiocytosis, the liver biopsy showed cirrhosis, and the BSP retention was 9.5%/45 min. Two episodes of gastrointestinal bleeding and the development of ascites, esophageal varices, and portal hypertension led to laparotomy, at which time a 1.2-cm side-to-side portacaval shunt was performed. Liver biopsy at the time of surgery showed diffuse macronodular cirrhosis, with dense bands of collagenized connective tissue connecting portal spaces and prominent proliferation of bile ducts; the pattern was consistent with cirrhosis due to healed histiocytosis X. The child is asymptomatic at the age of 5 yr. The second patient, a 14-month-old girl, was treated for histiocytosis X with prednisone, 6-mercaptopurine, and methotrexate. She had six episodes of gastrointestinal bleeding by the age of 7 yr. At this time, esophageal varices, hepatosplenomegaly, a prothrombin time 50% of normal, a serum albumin level of 2.9 g/100 ml, and portal hypertension were seen. A mesocaval shunt was performed. The patient has remained asymptomatic for 2.5 yr, despite the persistence of splenomegaly. The third patient, a 2.5-yr-old boy, was initially treated with vasopressin, aminopterin, and irradiation (600 rads) to the pituitary area. Growth failure occurred over the next 3 yr, hepatomegaly persisted, and the bilirubin level was mildly elevated. He was then treated with methotrexate (1.25 mg/day, p.o.). Sixteen months later, he had jaundice, hepatosplenomegaly, and prolonged prothrombin time. The liver biopsy showed diffusely nodular periportal fibrosis consistent with cirrhosis. He subsequently developed gastrointestinal bleeding. Hepatosplenomegaly persisted, and the BSP retention was 28%. A central splenorenal shunt was performed, and the patient remained asymptomatic until the age of 20, when he died from metastatic hepatoma. Portosystemic shunt procedures effectively relieve the threat of potentially fatal variceal hemorrhage and improve the opportunity for long-term survival in children with cirrhosis and portal hypertension due to healed histiocytosis X.

7453 RADIOLOGIC APPROACH TO OBSTRUCTIVE JAUNDICE AND PANCREATIC DISEASE.

(Eng.) Hawkins, I. F.; MacGregor, A. M.; Freimanis, A. (Dept. Radiology, Univ. Florida Coll. Medicine, Gainesville, FL 32610). *Med. Clin. North Am.* 59(1): 121-143; 1975.

Current radiologic procedures to evaluate jaundice or suspected pancreatic disease are discussed with emphasis on their applicability and accuracy, and an outline of the radiologic work-up of such cases is presented. The chief use of the plain film is to detect cholelithiasis, gallstones in the biliary tree, and calcification of the liver. Barium studies of the upper gastrointestinal tract are used mainly to detect primary neoplasms and also dilatation of the common duct and gallbladder. There is no oral or i.v. contrast medium for visualization of the biliary tree in the presence of hepatocellular or sustained jaundice. Endoscopic pancreatocholangiography with the side-viewing fiber duodenoscope allows visualization and cannulation of Vater's ampulla. It cannot detect small pancreatic neoplasms that do not involve the major ducts. Hepatic clearance of radioiodinated rose bengal is useful in distinguishing obstructions from hepatocellular disease, and some series have been reported with 95% accuracy. Selenium-labeled methionine for pancreatic scanning seldom fails to demonstrate major abnormalities, but it is incapable of defining the etiology. The main applications of ultrasound in the diagnosis of jaundice are: evaluation of the gallbladder and bile ducts, diagnosis of neoplasms and other masses in the pancreas and its vicinity that obstruct the common or other bile ducts, and evaluation of the liver, especially for intrahepatic masses. Each of these applications is discussed. Direct cholangiography is sometimes useful when other tests have failed to demonstrate the cause of jaundice. Percutaneous transhepatic cholangiography is successful in most cases in which the bile ducts are dilated, but in only 20%-50% when the ducts are not dilated. Other techniques briefly discussed are jugular transvenous cholangiography, femoral and antecubital transvenous cholangiography, angiography, and operative and postoperative cholangiography.

7454 MORPHOLOGICAL CHARACTERISTICS OF NEONATAL OBSTRUCTIVE JAUNDICE.

(Eng.) Balazs, M.; Lukacs, V. F.; Denes, J. (Janos Korhaz, H-1125 Budapest, Hungary). *Acta Paediatr. Acad. Sci. Hung.* 16(2):127-134; 1975.

Liver biopsy material from patients with neonatal obstructive jaundice was studied by electron microscopy. In material from a 5-week-old infant with biliary atresia, bile precipitates destroyed cell organelles in the liver cell cytoplasm. In some areas, the bile canaliculi were unusually wide. Some microvilli were destroyed, and their lumen contained a highly electron-dense material. There was increasing mitochondrial damage with time. The Kupffer's cells were swollen and showed intensive phagocytosis; bile precipitates of variable density were seen within the Kupffer's cells cytoplasm. The lumen of the sinusoids of this patient was considerably narrowed, due partly to active phagocytosis by the Kupffer's cells and partly to herniated areas of the cytoplasm that were partially imbibed with bile. This indicates that, in addition to cholestasis, hypoxia plays an active part in the development of the serious liver cell changes in biliary atresia. In the inspissated bile syndrome, the liver cell structure was generally unchanged; the main change was damage of the bile canaliculi and ductule membranes. In functional obstruction associated with isoimmunization and Rh incompatibility, no change was seen in the fine structure of the hepatic parenchyma, but deposits were present in the cytoplasm. The bile canaliculi were dilated, and the membranes were severely destroyed. In functional obstruction associated with ABO-incompatibility, there was mitochondrial damage in the liver cells, and high-density deposits were observed. Kupffer's cells were enlarged, showing accumulations of highly electron-dense pigments and damaged mitochondria.

7455 POSTOPERATIVE JAUNDICE. (Eng.) Koff, R. S. (Hepatology Section, Veterans Admin. Hosp., Boston, MA 02130). *Med. Clin. North Am.* 59(4): 823-829; 1975.

The causes of postoperative jaundice are reviewed. In patients with preexisting hepatocellular disease, postoperative renal failure may result in pronounced hyperbilirubinemia. The stresses of fasting and surgery may exacerbate hereditary hyperbilirubinemias and other familial disorders of bilirubin metabolism. Several factors contribute to postoperative overproduction of bilirubin. Hemolysis may be associated with transfusion, chronic hemolytic states (such as sickle-cell anemia), a deficiency in glucose-6-phosphate dehydrogenase, severe infection, or open-heart surgery. Hematoma resorption and pulmonary embolism also result in overproduction of bilirubin. Several types of hepatocellular disease may contribute to postoperative jaundice. Hepatitis-like conditions encountered postoperatively include viral hepatitis, the postpump (extracorporeal circulation) sydrome, drug- and/or anesthetic-induced hepatitis, and impaired perfusions resulting from congestive heart failure, shock, or hypoxemia. Hepatocellular disorders resulting from intrahepatic cholestasis may also be contributing factors, and they include sepsis, drug-induced cholestasis, or postoperative cholestasis. Other causes of hepatocellular disease that can result in postoperative jaundice include fatty liver and/or cirrhosis after intestinal bypass surgery for morbid obesity, hepatic resection, and hepatic dysfunction following liver transplantation. Extrahepatic biliary tract obstruction after bile duct surgery can result in postoperative jaundice, and acute postoperative cholecystitis has been reported following nonbiliary tract surgery in rare instances. Postoperative pancreatitis resulting from trauma or interrupted blood supply can also cause obstruction of the biliary tree.

7456 IATROGENIC ACCIDENT IN THE TREATMENT OF PORPHYRIA CUTANEA TARDA WITH CHLOROQUINE (RESOCHIN). (Ger.) Goerz, G.; Kreig, Th.; Eichenauer, M. G. (Universitats-Hautklinik, Moorenstrasse 5, D-400 Dusseldorf, W. Germany). *Arch. Dermatol. Forsch.* 255(2):169-176; 1976.

A porphyrin crisis following erroneous administration of a 10-fold higher dose of resochin (RS) than prescribed to a patient with porphyria cutanea tarda (PCT) is described. A 64-yr-old man with a history of gastric resection for chronic ulcers and surgery for lip carcinoma (with postoperative radiation) was found to have PCT, based on urinary porphyria excretion (6,960 μg/l). Instead of initiating RS therapy with 125 mg (twice weekly), an initial 1,250 mg dose was given. Within 24 hr, there were acute symptoms of fever, nausea, hypertension, joint pain, tachycardia, and subjective feeling of malaise--a clinical picture resembling acute episodes of porphyria acuta intermitteus (PAI). Urinary porphyrin excretion rose threefold (to 20,000 μg/l) but, unlike PAI, porphyrin precursor excretion remained normal and the relative amounts of kopro-, penta-, hexa-, hepta-, and uro-metabolites did not change. After 3 days, the symptoms regressed and the correct RS regimen was resumed in 12 days without complication. It is believed that RS overdoses exert a nonspecific membrane effect (perhaps especially in mitochondria), inducing a continuous porphyrin excretion and ultimate exhaustion of the hepatic porphyrin pool.

7457 DIAGNOSTIC METHODS IN LIVER DISEASE. (Eng.) Black, M. (Temple Univ. Health Sciences Center, Philadelphia, PA 19140). *Med. Clin. North Am.* 59(4):1015-1024; 1975.

7458 LIVER SIZE DETERMINATION IN PEDIATRICS USING SONOGRAPHIC AND SCINTIGRAPHIC TECHNIQUES. (Eng.) Holder, L. E.; Strife, J.; Padikal, T. N.; Perkins, P. J.; Kereiakes, J. G. (Union Memorial Hosp., Baltimore, MD). *Radiology* 117(2):349-353; 1975.

7459 HEPATIC SCINTIANGIOGRAPHIC PATTERNS. (Eng.) DeNardo, G. L.; Stadalnik, R. C.; DeNardo, S. J.; Raventos, A. (Univ. California Sch. Medicine, Davis, CA 95616). *Radiology* 111(1):135-141; 1974.

7460 EXPERIENCE WITH ^{111}In-CHLORIDE SCANNING IN PATIENTS WITH FOCAL DEFECTS ON ^{99m}Tc-SULFUR COLLOID LIVER SCANS. (Eng.) Abdel-Dayam, H. M.; Elkousy, A. M.; Leslie, E. V.; Panaro, V. A. (Dept. Radiology, State Univ. New York, Buffalo, NY 14203). *Radiology* 114(2):403-406; 1975.

7461 BIOCHEMICAL EVALUATION OF LIVER AND PANCREAS FOLLOWING SELECTIVE AND SUBSELECTIVE ANGIOGRAPHY. (Eng.) Goldstein, H. M.; Bookstein, J. J. (Univ. Michigan Medical Center, Ann Arbor, MI 48104). *Radiology* 111(2):293-295; 1974.

7462 ARTERIOGRAPHIC DEMONSTRATION OF COLLATERAL ARTERIAL SUPPLY TO THE LIVER AFTER HEPATIC ARTERY LIGATION. (Eng.) Koehler, R. E.; Korobkin, M.; Lewis, F. (Univ. California Sch. Medicine, San Francisco, CA 94143). *Radiology* 117(1):49-54; 1975.

7463 RECENT ADVANCES IN HEPATIC TRANSPLANTATION. (Fre.) Daloze, P.; Smeesters, C.; Delvin, E. E.; Corman, J.; Glorieux, F. H.; Bloch, P.; Fourtanier, G. (Hopital Notre-Dame, Universite de Montreal, Canada). *Ann. Chir.* 30(5):397-402; 1976.

7464 ORTHOTOPIC LIVER TRANSPLANTATION IN NINETY-THREE PATIENTS. (Eng.) Starzl, T. E.; Porter, K. A.; Putnam, C. W.; Schroter, G. P. J.; Halgrimson, C. G.; Hoelscher, M.; Reid, H. A. S.; Weil, R., III (Univ. Colorado Medical Center, Denver, CO). *Surg. Gynecol. Obstet.* 142(4):487-505; 1976.

7465 THE SPECTROPHOTOMETRIC DETERMINATION OF UROPORPHYRINOGEN I SYNTHETASE ACTIVITY. (Eng.) Grandchamp, B.; Phung, N.; Grelier, M.; Nordmann, Y. (Hopital Louis Mourier, 92701 Colombes, France). *Clin. Chim. Acta* 70:113-118; 1976.

7466 SERUM CHEMISTRY TEMPLATES OF DISEASE IN LIVER, PANCREAS, AND GALLBLADDER. (Eng.) Casey, A. E.; Hall, L. M.; Downey, E.; Copeland, H.; Mueller, T. J. (Dept. Pathology, Clinical Pathology, and Biochemistry, Univ. Alabama, Birmingham, AL). *South. Med. J.* 68(9):1125-1132; 1975.

7467 ASCITES AND RENAL FAILURE IN PRIMARY LIVER CELL CARCINOMA. (Eng.) Arroyo, V.; Rodes, J.; Bosch, J. (Hospital Clinico y Provincial, Univ. Barcelona, Barcelona, Spain). *Br. Med. J.* 3(5984):629; 1975.

7468 LYMPH NODE AND HEPATIC GRANULOMATA ASSOCIATED WITH CARCINOMA [Abstract]. (Eng.) Saunders, J. (St. Thomas's Hosp., London SE1 7EH, England). *Br. Med. J.* 1(6007):437-438; 1976.

7469 PRIMARY HEPATIC TUMOR IN CHILDREN. (Eng.) Huang, H.-C.; Lee, C.-H.; Lee, T.-C. (Natl. Taiwan Univ. Hosp., Taiwan, China). *Acta Paediatr. Sin.* 15(3):98-106; 1974.

7470 BENIGN TUMORS OF THE LIVER. (Eng.) Ishak, K. G.; Rabin, L. (Armed Forces Inst. Pathology, Washington, DC 20306). *Med. Clin. North Am.* 59(4):995-1014; 1975.

7471 CANCER ARISING ON CIRRHOSIS OF REGENERATIVE NODE. (Eng.) Biersack, H. J.; Bucheler, E.; Hunermann, B.; Schulz, D.; Winkler, C. (Institut fur klinische und experimentelle Nuklearmedizin, Univ. Bonn, 53 Bonn Venusberg, Germany). *Roentgenblaetter* 28(9):399-406; 1975.

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7473 CHOLESTASIS--AN INVARIABLY DIFFICULT DIAGNOSTIC PROBLEM. (Por.) da Costa Gayotto, L. C. (Dept. de Patologia, Universidade Federal de Santa Catarina. Florianopolis, Brazil). *Arq. Gastroenterol.* 12(4):223-226; 1975.

7474 RESULTS OBTAINED WITH EXTRACORPOREAL PIG LIVER PERFUSION AND EXCHANGE TRANSFUSION IN FOUR HEPATIC COMA CASES. (Ita.) Scopinaro, N.; Anfossi, A.; Griffanti-Bartoli, F.; Civalleri, D.; Gianetta, E.; Sorice, G.; Germi, M.-R.; Caponnetto, A.; Bachi, V. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica B, Universita degli Studi, Genova, Italy). *Minerva Med.* 67(18):1187-1195; 1976.

7475 CONGENITAL DILATATION OF INTRAHEPATIC AND COMMON BILE DUCTS WITH CONGENITAL HEPATIC FIBROSIS. (Eng.) Fujiwara, Y.; Ohizumi, T.; Kakizaki, G.; Fujiwara, T. (No affiliation given). *J. Pediatr. Surg.* 11(2):273-274; 1976.

7476 PLAIN FILM RECOGNITION OF THE LIGAMENTUM TERES HEPATIS. (Eng.) Haswell, D. M.; Berne, A. S.; Schneider, B. (Crouse-Irving Memorial Hosp., 736 Irving Ave., Syracuse, NY 13210). *Radiology* 114(2):263-267; 1975.

7477 ANGIOGRAPHY OF THE NEPHROGENIC HEPATIC DYSFUNCTION SYNDROME. (Eng.) Mena, E.; Bull, F. E.; Bookstein, J. J.; Goldstein, H. M.; Neiman, H. L.; Thornbury, J. R.; Lim, C. G. (Univ. Michigan Medical Center, Ann Arbor, MI 48104). *Radiology* 111(1):65-68; 1974.

7478 ARTERIAL COLLATERALS IN INTRAHEPATIC ARTERIAL OCCLUSION. (Eng.) Pettersson, H. (Dept. Diagnostic Radiology, Univ. Lund, Malmo Allmanna Sjukhus, S-21 401 Malmo, Sweden). *Acta Radiol. [Ther.] (Stockh.)* 16(4):401-406; 1975.

7479 FATAL SELF-MEDICATION WITH RETINOL AND CARROT JUICE [Abstract]. (Eng.) Leitner, Z. A.; Moore, T.; Sharman, I. M. (52 Welbeck St., London, WIM 7H3, England). *Proc. Nutr. Soc.* 34(2):44A-45A; 1975.

See also, 6930, 7092, 7108, 7110, 7111, 7114, 7115, 7117, 7119, 7129, 7130, 7131, 7133, 7136, 7139, 7141, 7142, 7143, 7144, 7145, 7146, 7147, 7148, 7225, 7291, 7407, 7495, 7499, 7501, 7507, 7524, 7528, 7561, 7562, 7564, 7608, 7622, 7624, 7641, 7646, 7647, 7648, 7649.

Hyperbilirubinemic States

7480 FORMATION AND ELIMINATION OF BILIRUBIN.

(Eng.) Bissell, D. M. (Gastrointestinal Res. Unit, Univ. California, San Francisco, CA 94143). *Gastroenterology* 69(2):519-538; 1975.

Bilirubin metabolism, from heme uptake and degradation to bilirubin transport and its eventual secretion into bile, is reviewed along with forms of hyperbilirubinemia. Bilirubin is produced by catabolism of the heme of hemoglobin by the reticuloendothelial system and the parenchymal cells of the liver. The hepatic parenchymal cell is the site of bilirubin formation from exogenous and multiple endogenous forms of heme. Specific mechanisms for their degradation are unknown, but recent studies implicate the microsomal heme oxygenase (MHO) system in degradating the heme of cytochrome P-450. The breakdown of hemoglobin heme, also a function of hepatic parenchymal cells, may be mediated by the same or other mechanisms, such as coupled oxidation. Bilirubin is eliminated from the blood and enters into the bile by dissociation from plasma albumin, transfer into hepatic parenchymal cells, binding to intracellular proteins, conjugation, and secretion across the canalicular membrane. Investigations into hyperbilirubinemia have focused on familial hyperbilirubinemias (Gilbert's, Crigler-Najjar, Dubin-Johnson, and Rotor syndromes), in which the defect is likely to be single and steady-state conditions prevail. Caloric restriction, which increases the plasma concentration of bilirubin, and phenobarbital administration, which has a reverse effect, may alter the formation and excretion of bilirubin. Their sites of action in bilirubin metabolism are being studied.

7481 JAUNDICE IN INFANTS OF GREEK PARENTAGE: THE UNKNOWN FACTOR MAY BE ENVIRONMENTAL.

(Eng.) Drew, J. H.; Kitchen, W. H. (Mercy Maternity Hosp., Clarendon St., East Melbourne, Victoria, 3002, Australia). *J. Pediatr.* 89(2):248-252; 1976.

Studies were undertaken in a Greek community in Australia to determine if the increased incidence and severity of jaundice seen among infants in some areas of Greece is genetically determined. When the daily bilirubin levels in 43 Greek and 124 Australian infants were determined for 2 months and compared, there were no significant differences between the two groups. The mean maximum serum bilirubin levels were 7.91 mg/dl in the Greek infants and 7.61 mg/dl in the Australian infants, and these peaks were reached at 69.7 and 63.2 hr of age, resp. ($p=0.03$). Among 220 Australian and 887 Greek infants in a second series, the mean serum bilirubin levels were 7.34 mg/dl in the Greek infants and 6.79 mg/dl in the Australian infants at 48 hr of age, and 8.30 mg/dl in the Greek infants and 7.75 mg/dl in the Australian infants at 72 hr of age. The statistical comparisons of those infants with levels above 12 mg/dl, above 16 mg/dl, and above 20 mg/dl at 74 hr of age revealed no differences between the Greek and Australian infants. There were no significant differences between the Greek and Australian infants in capillary or cord blood hemoglobin concentrations or in reticulocyte counts. Fifty-one of 2,617 Greek infants in a third series required exchange transfusions during a 37-month period, which was similar to the number of Australian infants (365/18,102). Twenty of 305 Greek infants required phototherapy, compared to 264 of 9,482 non-Greek infants ($p<0.01$). There was a strikingly low frequency of Rhesus incompatibility (31.4%) and a high frequency of other major blood group incompatibilities (47.1%) among the Greek infants with severe jaundice, in comparison to the respective frequencies in the Australian infants (77.9 and 8.6%; $p<0.02$ in both cases). Information regarding the county of birth of 781 mothers and 77 fathers of Greek infants was obtained; individual serum bilirubin levels at 48 and 72 hr for each county of maternal and paternal birth were compared by a chi-square correlation, which showed no significant difference in any county. The results indicate that the high frequency of severe neonatal jaundice that has been demonstrated throughout Greece is not carried with those who immigrate. Future studies of this problem in Greece should concentrate on regional environment rather than upon genetic influences.

7482 URINARY PHOTOCATABOLITES OF BILIRUBIN IN JAUNDICED NEONATES.

(Eng.) Bajpai, P. C.; Srivastava, K. L.; Singh, B.; Krishna Murti, C. R.; Kapoor, C. L. (King George's Medical Coll., Lucknow, India). *Indian J. Med. Res.* 64(4):529-536; 1976.

To elucidate the mechanism of the toxicity of the photodegradation products of bilirubin, the pattern of urinary excretion of bilirubin metabolites was compared in eight nonicteric, untreated neonates; eight jaundiced, untreated neonates; eight jaundiced neonates who received phenobarbital (5 mg/kg); and eight jaundiced neonates who received continuous phototherapy. Catabolite excretion was increased in the neonates receiving phototherapy. *In vitro* photo-oxidized bilirubin resolved into seven spots on paper chromatography, but in the urine of jaundiced neonates subjected to phototherapy, 10 different metabolites were detected. The urine of the untreated nonicteric babies showed only 2-4 spots, whereas the urine of jaundiced untreated newborns or that of jaundiced babies treated with phototherapy showed only 3-5 spots. The results suggest that, in addition to the normal bilirubin degradation product by hepatocytes, jaundiced neonates receiving phototherapy excrete a number of photo-oxidation products of the bile pigment.

7483 DUBIN-JOHNSON'S SYNDROME. A ONE-FAMILY STUDY.

(Spa.) Ortega Negrin, S.; Fernandez Castellanos, G.; Vergara Dominguez, B.; Alvarez Alonso, M.; Garcia Reina, V.; Diaz, J. M. (Hospital "Pedro Borras," F y 29, Vedado, Habana, Cuba). *Rev. Cubana Pediatr.* 47(2):287-293; 1975.

7484 BENIGN CONJUGATED HYPERBILIRUBINEMIA WITH PIGMENT IN THE LIVER (DUBIN-JOHNSON'S SYNDROME). PART II. ACTIVE SCREENING OF SUBJECTS WITH PROTRACTED BSP TEST. (Slo.) Sosovec, V.; Ivicic, L.; Gaspar, I.; Lachova, B. (Vnutornę oddelenie, Nemocni s poliklinikou, Levoca, Czechoslovakia). *Cesk. Gastroenterol.* 29(8):517-526; 1975.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

7485 THE ROLE OF ENDOTOXIN IN LIVER INJURY. (Eng.) Nolan, J. P. (Dept. Medicine, State Univ. New York at Buffalo, Buffalo, NY). *Gastroenterology* 69(6):1346-1356; 1975.

The role of the endotoxins from intestinal bacteria in the hepatic and extrahepatic manifestations of certain liver diseases is reviewed. A synergism exists between endotoxic and other hepatotoxic factors, such as nutritional or choline deficiency, which interact and lead to the development of cirrhosis. Possible mechanisms that may contribute to hepatic sensitivity to gastrointestinal tract endotoxins include alteration of serum and tissue factors necessary for detoxification, increased intestinal absorption of endotoxin, and hormonal influences (protection with steroids, but enhanced susceptibility with estrogens). The inability of the normal liver to deal with the small amounts of lipopolysaccharide ordinarily presented to it may accentuate existing hepatic damage by allowing toxic endotoxin levels to develop in the liver tissue and by allowing endotoxin to enter the systemic circulation. Animal experiments have shown that endotoxicity can be modified by increasing resistance through the development of nonspecific tolerance or specific immunization; by decreasing gut absorption by oral nonabsorbable antibiotics, cholestyramine resin, or immunization; and by removing the circulating endotoxin through hemoperfusion with Dowex 1-X2 resin or activated charcoal.

7486 N-PROPYL-AJMALINE-INDUCED INTRAHEPATIC CHOLESTASIS. (Ger.) Buscher, H. P.; Talke, H.; Rademacher, H. P.; Gessner, U.; Oehlert, W.; Gerok, W. (Medizinische Universitatsklinik, 7800 Freiberg, Hugstetter Str. 55, W. Germany). *Dtsch. Med. Wochenschr.* 101(18):699-703; 1976.

Two case histories of N-propylajmaline (NPA) hepatotoxicity are detailed. A 42-yr-old man with no personal history of hepatobiliary problems received NPA for 3 weeks for management of ventricular extrasystoles. Within a week the patient became febrile, with onset of icterus and hepatomegaly. Liver biopsy revealed periportal field inflammation with lymphoplasma cell elements, but predominantly eosinophilic clusters in the ducts. The ductal epithelium was partially destroyed and surrounded by lymphohistiocytic and eosinophilic elements. There were intralobular nuclear polymorphism and dilated bile capillaries with thrombose Intralobular inflammation was slight. Diagnosis was marked florid eosinophilic cholangitis and cholangiolitis with prominent cholestasis and cholestatic hepatitis. The bilirubin, SGPT, SGOT, alkaline phosphatase, neutral fat, and cholesterol increased under tetracycline, but gradually normaliz under ampicillin. Cholinesterase and gamma-globulin were unaffected. The second case, a 34-yr-old woman with an unexceptional history was given NPA for extrasystole management followed within a week by gastrointestinal symptoms, pruritus, and icterus. There was no hepatomegaly, but liver histology resembled that described for the first case, except for the presence of fatty hepatocyte vacuolization (30%) and glycogen deposition associated with the nuclear polymorphism. Diagnosis was eosinophilic cholangitis and pericholangitis with extensive cholestasis, a glycogen pattern resembling diabetes mellitus, and fatty liver. Prednisone (50 mg) supplemental to 100 mg of doxycycline for 3 days elicited rapid improvement. Although steroid management was ameliorative in the second case, the therapeutic effect of ampicillin in the first case is questionable, since the leucine aminopeptidase, gamma-glutamyl transpeptidase, and alkaline phosphatase elevations probably normalized spontaneously. Both cases represent allergic-hyperergic drug trauma reactions.

7487 OXYPHENISATIN-INDUCED LIVER DISEASE. (Ger Lindner, H.; du Bosque, G.; Dammermann, R.; Kloppel, G.; Krause, D. (Medizinische Abteilung, Deutsches-Rotes-Kreuz-Krankenhaus, 2 Hamburg 13, Bei Schlump 84, Hamburg, W. Germany). *Dtsch. Med. Woche schr.* 100(49):2530-2535; 1975.

The little-known problem of laxative hepatitis (LH) and its recurrence is reconsidered. The clinical sample included 14 women patients with a 2- to 20-yr history of oxyphenisative (OPS) laxative abuse and symptomatic history of epigastric pain (between 2 months and 6 yr), fatigue, arthralgia, skin irritation, nausea, vomiting, and febrility. In the interval between hepatic crises, a reexposure dose of 10 mg OPS (triacetyldiphenolisatin) was given twice on 2 successive days. The clinical picture was multiple, uncharacteristic, and could only be identified as chronic or acute liver or gallbladder dis-

e. The spectrum from absent to greatly elevated
tivity and from periportal fibrosis to progressive
rotic cirrhosis was found in biochemical, immuno-
ologic, laparoscopic, and histological assays.
6 of 10 cases, immunofluorescence found diminished
ibody titer to nuclei and smooth muscle. All 14
ients reached normal laboratory levels and histo-
ically confirmed inactivity after interruption of
. During reexposure to OPS, the average GOT
el rose to 144 U/l, SGPT to 97 U/l, and glutamic
ydrogenase to 25 U/l. The bilirubin response is
ultative and icterus never an obligatory symptom.
is believed that OPS is resorbed in the intes-
es, metabolized in the liver, and in nonresorb-
e form, secreted in the bile. The metabolite,
ne or after protein binding, releases an aller-
reaction in the bile duct system.

38 GLUCOSE HOMEOSTASIS IN PATIENTS WITH PARACETAMOL-INDUCED LIVER DAMAGE [Ab-
act]. (Eng.) Record, C. O.; Chase, R. A.; Alber-
, K. G.; Williams, R. (King's Coll. Hosp., Lon-
, England). *Digestion* 12(4/6):341-342; 1975.

39 ASSESSMENT OF THE RANGE OF LIVER DAMAGE SUSTAINED IN 54 PATIENTS FOLLOWING PARA-
TAMOL (ACETOMINOPHEN) [Abstract]. (Eng.) James,
; Pulman, L. Lesna, M.; Watson, A. J. (Dept Medicine and Pathology, Univ. Newcastle upon Tyne, Newcastle upon Tyne, England). *Digestion* 12(4/6):315-316; 1975.

7490 LIVER FUNCTION TESTS AND HISTOLOGY IN SURVIVORS OF ACUTE PARACETAMOL (ACETAMINOPHEN) POISONING [Abstract]. (Eng.) Hamlyn, A. N.; James, O. F. W.; Lesna, M.; Roberts, S. H.; Watson, A. J.; Douglas, A. P. (Royal Victoria Infirmary, Newcastle upon Tyne, Northumberland, England). *Gut* 16(10):838; 1975.

7491 RADIATION HEPATITIS: ANOTHER LOOK AT ITS PATHOPHYSIOLOGY [Abstract]. (Eng.) Swartz, H. M.; Kinzie, J. J.; Hensley, G. (Medical Coll. Wisconsin, Milwaukee, WI 53226). *Invest. Radiol.* 10(5):464; 1975.

7492 SLOWING OF HEPATIC BLOOD FLOW BY HALOTHANE: ANGIOGRAPHIC MANIFESTATIONS. (Eng.) Berger, P. E.; Culham, J. A. G.; Fitz, C. R.; Harwood-Nash, D. C. (Hosp. Sick Children, Toronto, Ontario, Canada). *Radiology* 118(2):303-306; 1976.

7493 LOBAR DEARTERIALIZATION IN LIVER TRAUMA. (Eng.) Tanphiphat, C. (Chulongkorn Hosp., Bangkok 5, Thailand). *Br. J. Surg.* 63(3):213-215; 1976.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

94 HEPATITIS IN CLINICAL LABORATORIES 1973-74. (Eng.) Grist, N. R. (Ruchill Hosp., Glas-
G20 9NB, Scotland). *J. Clin. Pathol.* 29(6):480-
; 1976.

-yr survey (1970-1972) of the incidence of hepa-
is occurring in clinical laboratories was con-
ued in a simplified form. A questionnaire was
t to members of the Association of Clinical Path-
gists in 1975, for the period 1973-1974. Thirty-
cases of hepatitis were reported in 28 labora-
ies, and 14 of these cases were of hepatitis B.
is represented an average annual attack rate of
per 100,000. Clusters of hepatitis cases occurred
the following groups: science-biochemistry,
dical-morbid anatomy, and technician-hematology.
e average attack rates per 100,000 for these groups
re 308, 302, and 292, resp. None of the 32 cases
s fatal, and only seven patients required hospital-
ation. The results suggest that the risk of hepatitis to laboratory staff falls into place among other occupational risks that require surveillance and precautions.

7495 HEPATITIS Bs ANTIGEN AND LIVER CANCER: A POPULATION BASED STUDY IN KENYA. (Eng.) Bagshawe, A. F.; Gacengi, D. M.; Cameron, C. H.; Dorman, J.; Dane, D. S. (Dept. Medicine, Univ. Nairobi, Nairobi, Kenya). *Br. J. Cancer* 31(5):581-584; 1975.

The prevalence of hepatitis B antigenemia was determined in two geographically different areas (differing in altitude) where the incidence of primary liver cancer (PLC) is known to differ. Hepatitis B surface antigen (HBsAg) was detected by radioimmunoassay in 59 of the 1,833 samples from the population. Twenty-one positive samples (2.7%) were from a high altitude area, and 38 (3.6%), from the low altitude area. In a previous study, the high altitude area had a lower incidence of PLC than did the low altitude area, and the aflatoxin levels in food samples in the high altitude area were lower than those in the low altitude area. The results fail to demonstrate any significant difference in the prevalence of HBsAg in these two areas, suggesting that aflatoxin may be a major cause of PLC in Kenya.

7496 CAN VIRAL HEPATITIS BECOME CHRONIC UNDER THERAPY? (Ger.) Muller, R. (Abt. Gastroenterologie, Dept. Innere Medizin, Med. Hochschule Hannover, Karl Wiechert Allee 9, D-3000 Hannover, W. Germany). *Munch. Med. Wochenschr.* 118(21):679-681; 1976.

The evidence that clinically mild viral hepatitis B infection can be iatrogenically protracted, leading to persistence or elevation of the hepatitis B surface antigen (HBsAg) and chronic liver disease, is examined. The three available therapies include gamma-globulin (GGT), steroids, and cytostatics and immunosuppressives (CIT). With GGT, the use of HB-hyperimmunoglobulin shortly after exposure or in early incubation can mitigate infectivity but also arrest endogenous antibody formation such that the infection cannot be overcome. With steroid therapy, there is a suppression of RNA synthesis in lymph tissue, which elicits lymphocytolysis and, possibly, also an adverse effect on interferon. Factors responsible for chronicity in steroids are even more intensive in CIT. Extinction of antibody titers beyond measurable range are not uncommon. In hemodialysis, the disease becomes anicteric and subclinical, with HBsAg persistence in the vast majority of cases. Despite incompleteness of data and absence of effective statistics, there is no evidence that GGT, steroids, and CIT do not induce a switch from acute to chronic forms. It is even conceivable that immunological competence could be so attenuated that reinfection is possible.

7497 PREVENTION OF POST-TRANSFUSION HEPATITIS. ROLE OF SENSITIVE HEPATITIS B ANTIGEN SCREENING TESTS, SOURCE OF BLOOD AND VOLUME OF TRANSFUSION. (Eng.) Koretz, R. L.; Gitnick, G. L.; Mitchell, J. E.; Damus, K.; Ritman, S. G.; Golub, L.; Kash, P. L. (Div. Gastroenterology, Dept. Medicine, Center for Health Sciences, Univ. California, Los Angeles, CA 90024). *Am. J. Med.* 59(6):754-760; 1975.

The role of sensitive hepatitis B surface antigen (HBsAg) screening tests, the source of blood, and the volume of transfusion in the prevention of post-transfusion hepatitis (PTH) was investigated in 112 patients. Aliquots from units of blood were screened by radioimmunoassay (RIA) and reverse passive hemagglutination (RPHA) shortly after transfusion. Recipients of positive units (HBsAg recipients, 21; RIA false positives, 34; RIA indeterminant positives, 15) as well as control subjects (42) were followed prospectively for evidence of either PTH or exposure to hepatitis B (HB). The incidence of HB in the RPHA-positive (59%) and RIA-positive (53%) patients was significantly higher ($p<0.005$ and $p=0.005$, resp.) than in the control patients (17%). Similarly, the incidence of HB exposure was significantly higher in these two groups (76% and 67% versus 29%, $p<0.001$ and $p<0.01$, resp.). The incidence of non-HB was the same in the three groups. A total of 83% of the 1,045 U of blood given as transfusion to the 112 patients came from commercial blood banks. Of these, 21 U were positive, with 19 originating from commercial sources. Although there is a slightly higher proportion of positive units in the commercial compared to the voluntary sources in both groups, these differences are not significant ($p>0.10$). The overall incidence of PTH was higher in the recipients of all commercial blood (41% versus 0%, $p>0.05$). A major relation could not be demonstrated between an increased frequency of PTH and increasing amounts of transfused blood.

7498 IMMUNISATION AGAINST HEPATITIS B IN MAN. (Eng.) Maupas, P.; Coursaget, P.; Goudeau, A.; Drucker, J. (Institut de Virologie de Tours, 2 bis Boulevard Tonnelle, 37000 Tours, France). *Lancet* 1(7974):1367-1370; 1976.

An inactivated vaccine against hepatitis B was prepared from blood donor hepatitis B surface antigen (HBsAg) purified on immunoadsorbents. Of the 45 subjects who were vaccinated, 35 produced antibodies against HBsAg. A primary humoral response was noted in 28 subjects. Of the 39 subjects who had no serological marker of past hepatitis B infection, 28 had a primary humoral response and 4 had a cellular immune response, demonstrated by skin test with vaccinal HBsAg. In the 28 subjects with a hormonal response, anti-HBsAg was detected early in 11 cases. In the remaining 17 cases, anti-HBsAg appeared 2-3 months after the first injection. This pattern of anti-HBsAg production was similar to that noted in natural infection. After two injections separated by 1 month, 7 (18%) vaccinated subjects did not respond by specific, detectable signs of immunity. The fact that HBsAg antibodies are still present at protective levels 6 months after the first injection indicates that a yearly booster should suffice. In a hemodialysis unit, no vaccinated subject gave any sig of clinical or biological hepatitis, while during the same time period, 43% of nonvaccinated patients became HBsAg-positive. No significant differences in immunological responses were noted between dialyzed patients and ward staff. This vaccination may be the first instance of prevention of a potentially oncogenic viral infection, in that by specific vaccination against hepatitis B in areas of high endemicity for hepatitis-hepatoma, it might be possible to interrupt or even eradicate this process.

7499 HIGH-TITRE HEPATITIS B IMMUNE GLOBULIN. (Eng.) Anonymous (No affiliation given). *Br. Med. J.* 1(6004):241-242; 1976.

Recent studies concerning the use of immune-globulin-containing high titers of antibody to the hepatitis

surface antigen (HBsAg) for the prevention of hepa-
itis B virus infection among members of dialysis
nits and spouses of hepatitis patients are reviewed.
mong 251 persons who were exposed to hepatitis B
irus by accidently pricking a finger on a needle
ontaminated with blood from an HBsAg-positive pa-
ient, hepatitis developed within 6 months in 17
ho were immunized with a low-titer globulin; among
53 similarly exposed persons who were given the new
igh-titer globulin, only 5 developed hepatitis with-
n the same period. After a further 3-month follow-
p, six more cases had appeared, all in the group
iven the high-titer globin. One explanation might
e that the high-titer globulin may have completely
revented the development of active immunity; this
heory is supported by one study in which the fre-
uency of antibody to HBsAg rose progressively dur-
ng follow-up and at 6 months was significantly
igher in those receiving low-titer globulin than
n the high-titer group (32% and 7%, resp.). It
eems that repeated injections of hepatitis B immune
lobulin will be required if there is a likelihood
f further exposure, although the long-term hazards
f such an approach are unknown.

500 INCIDENCE OF VIRAL HEPATITIS AFTER ADMINISTRATION OF FACTOR IX CONCENTRATES.

Eng.) Iwarson, S.; Kjellman, H.; Teger-Nilsson,
. C. (Univ. Goteborg, East Hosp., Goteborg,
weden). *Vox Sang.* 31(2):136-140; 1976.

linical trials with the human factor IX concen-
rates, Konyne and Preconativ, were carried out to
etermine the incidence of clinical hepatitis,
hich has been frequently reported after treatment
ith Konyne. During the first 2 yr of the trial,
6 patients were treated with either one or both
reparations. Nine patients developed viral hepa-
itis within 6 months after treatment. During the
ext 4 yr, another 26 hemophiliacs were treated
ith Preconativ alone. Only two cases of hepa-
itis occurred. Selection of donors and screening
or hepatitis B surface antigen in donor blood used
or the manufacturing of Preconativ might be con-
ributing factors to this low hepatitis incidence.

501 CYTOPHOTOMETRIC STUDIES OF THE DNA, NUCLEIC ACID AND PROTEIN CONTENT OF LIVER CELL UCLEI FROM PATIENTS WITH VIRUS HEPATITIS. (Eng.)

anek, L. (Rigshospitalet, 9 Blegdamsvej, DK-2100
openhagen 0, Denmark). *Acta Pathol. Microbiol.*
cand. [*A*] 84(1):1-8; 1976.

o investigate the cause of the increased size of
epatocyte nuclei seen in viral hepatitis, the nuclear
ize and the nuclear contents of DNA, nucleic acid,
nd protein were measured by cytophotometry in 45
iver biopsies from patients with acute viral hepa-
itis and in control biopsies. Both control nuclei
nd nuclei from the patients were predominantly di-
loid. The average area of nuclei from hepatitis
atients (96 μm^2) was significantly greater than that
f the nuclei from the controls (79 μm^2, $p<0.001$).
he DNA content in both control nuclei and nuclei
rom the hepatitis patients was similar. UV spectrophotometry of 34 nuclei from two patients demonstrated an average nucleic acid content of 8 pg, whereas that in the controls was significantly lower (7 pg). There was also a positive correlation between nuclear size and nuclear protein content. The increased nuclear size seen in viral hepatitis is primarily due to a higher protein content, suggesting that the nuclear function is increased during the course of this disease.

7502 THE LACTATE DEHYDROGENASE ISOENZYMES IN VIRAL HEPATITIS. (Ger.) Eisenburg, J.;

Kellner, E.; Munte, A. (I. Med. Univ.-Klinik, Ziemssenstrasse 1, 8 Munchen 2, Munich, W. Germany). *Fortschr. Med.* 94(12):673-688; 1976.

The differential diagnostic and prognostic role of serum LDH isoenzymes in acute and chronic human viral hepatitis is examined. Agar gel electrophoresis was the method of choice for heterogenous LDH separation. An assay of 23 healthy control persons established five LDH isozyme patterns; there was no sex difference. In four patients, in the early healing phase after acute viral hepatitis (AVH), the total (in IU) LDH was 185, LDH_1 was 120, LDH_2 was 50, LDH_3 was 10, and LDH_4 and LDH_5 were negligible; GOT and GPT were less than 20 IU. Among 20 patients with acute viral hepatitis, there were 4 with LDH_5 levels over 100 IU, with a total LDH in excess of 400 U/1 and SGOT-SGPT elevations above 1,500 U/1. In seven cases of delayed healing, LDH_5 was 32-100 IU. In recurrences of acute viral hepatitis, GPT rose more rapidly to higher levels than did LDH_5. Nine patients with acute viral hepatitis had elevated transaminases, but normal LDH_5, during the first 3 weeks of the disease. In hepatitis with acute recurrences, the LDH_5, transaminase, and total LDH activity curves were parallel. There was no correspondence between enzymatic and histological diagnoses in nine patients with chronic viral hepatitis since the mesenchymal inflammation and epithelial lesions are not concomitant. In two cases where total LDH, SGOT-SGPT, and LDH_5 were increased concurrently, the LDH_1-LDH_4 fractions were unexceptional; in both patients, the GOT/GPT exceeded 2 IU and the prognosis was highly unfavorable. In general, discrepancies between SGPT and LDH_5 are more frequent in chronic viral hepatitis than in the acute form. LDH_5, total LDH, and transaminase levels changed little in chronic viral hepatitis or in incipient cirrhosis with negligible inflammation, in fatty liver, and in extrahepatic obstructive jaundice. In 18 patients with concurrent primary liver carcinoma and cirrhosis, the LDH_5 activity increased proportionately with the degree of hepatomegaly and disproportionately with total LDH activity. Total LDH was markedly elevated in preterminal progressive cirrhosis, especially after hunger dystrophy. The LDH isozyme patterns are too insensitive to find diagnostic use in chronic hepatitis; their value is restricted to hepatitic icterus and primary carcinoma in cirrhotic livers.

7503 SERUM LEVEL CHANGES OF ENDOGENOUS AND POST-HEPARIN DIAMINE OXIDASE (HISTAMINASE) IN CLINICAL AND EXPERIMENTAL HEPATITIS. (Eng.) Gang,

V.; Baldus, M.; Kadereit, M. (Medizinische Universitatsklinik, Josef-Schneider-Strasse 2, 87 Wurzburg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 23(2):104-109; 1976.

Serum level changes of endogenous and posthepatic diamine oxidase (DAO, histaminase) were investigated in 14 healthy volunteers, 12 patients with acute viral hepatitis, and in female Wistar rats. All human subjects received 200 U heparin/kg i.v. for DAO release. In the rats, galactosamine hepatitis was produced by 800 mg Gal-N/kg i.p., and the animals received 1,250 U heparin i.v. 6-72 hr later. Blood samples were taken from humans and animals up to 3 hr after heparin injection. The DAO levels in all the patients were significantly decreased (from 29.5 to 17.0 mU/l plasma), but the levels in the rats were increased (from 32.5 to 60.0 mU/l plasma). Some patients showed at the time of maximum DAO elevation (90 min), values below 10% of controls. The time course of postheparin diamine oxidase (PHD) was investigated in one hepatitis patient. With normalization of SGPT values, there was a tendency for PHD to increase, and an inverse correlation was found between the two. In the rats, a fivefold increase in DAO was observed 48-72 hr after Gal-N application. This increase was correlated significantly to the increase of PHD ($r=0.685$, $p<0.0005$, $n=54$). It is concluded that in the rats, increases in DAO levels were mediated by endogenous heparin, released from disrupted mast cells. In the hepatitis patients, the decreased endogenous and postheparin DAO levels would correspond to a depletion of the enzyme-containing organs.

7504 INFECTIOUS PARTICLES IN HEPATITIS. (Eng.)

Waterson, A. P. (Dept. Virology, Royal Postgraduate Medical Sch., Univ. London, Ducane Road, London, W. 12, England). *Annu. Rev. Med.* 27:23-35; 1976.

Information on the as yet unidentifiable, filterable agents responsible for most cases of acute hepatitis in men is reviewed. There are at least two known agents, hepatitis A and B. Hepatitis B can be identified in patients and carriers by finding the hepatitis B antigen (HBAg) in the blood. Hepatitis A has no corresponding antigen in the blood, but particles have been found in the feces of patients and experimentally infected human subjects. Hepatitis B boasts a DNA-containing particle, the Dane particle, which is linked to the clinical illness and resembles a conventional DNA virus. However, it does not share the exact morphology of any known virus. For hepatitis A, a particle that is identical in morphology with the enteroviruses has been described, but its relation to the illness has not been determined. Concerning hepatitis A, studies of its transmission to marmosets and the correlation with human infection, electron microscope studies on natural and artificial human infections, grounds for associating the 27-nm particle with this agent, and its relation to gastroenteritis viruses in man and other vertebrates are summarized. With respect to hepatitis B, the Dane particle, the antigenic makeup of HBAg, and the preparation of vaccines consisting of HBAg from which Dane particles have been removed are reviewed.

7505 SEROLOGICAL HEPATITIS-B CHARACTERISTICS IN CLINICAL LABORATORY CONTROL SERA. (Ger.)

Lehmann, H.; Bruhn, H. D.; Schlaak, M. (Abteilung Allgemeine Innere Medizin der Univ., 2300 Kiel, Schittenhelmstr. 12, W. Germany). *Dtsch. Med. Wochenschr.* 101(18):688-689; 1976.

The presence of hepatitis B surface antigen (HBsAg) and its antibody (anti-HBs) were assayed in various control sera from different sources. With countercurrent electrophoresis, all 99 serum samples were negative for HBsAg and anti-HBs. With radioimmunology, 4 of the 99 samples were HBsAg-positive and 45 were anti-HBs-positive; 50 had no HBs characteristics. Relative to the number of reference sera (29), 4 were HBsAg-positive, and 5 were anti-HBs-positive; 20 were without HBs involvement. The danger posed by HBsAg-positive reference sera is amplified, since they are used over a period of many weeks. Serum samples that are pooled for preparation of standard sera should be tested radioimmunologically for HBsAg and anti-HBs.

7506 HEPATITIS B SURFACE ANTIGEN AND HUMAN SERUM PROTEINS. (Eng.)

Schuurs, A. H. W. M.; Wolters, G. (Organon Scientific Development Group, Oss, Netherlands). *Am. J. Med. Sci.* 270(1):173-177; 1975.

The purification of hepatitis B surface antigen (HBsAg) is described and the presence of human serum proteins in the antigen was investigated. The purification involved digestion with pepsin preceded and followed by ultracentrifugation. Most often, two pepsin digestions were required to obtain preparations in which serum proteins could no longer be detected by immunodiffusion. Pepsin treatment did not seem to affect the subtypes *d* and *y*. It did not cause any appreciable loss of immunochemical HBsAg activity. Hyperimmunization of sheep with these preparations in complete Freund's adjuvant evoked high-titered anti-HBs sera that sometimes contained antibodies to serum proteins. These antibodies were removed easily by treatment of the antiserum with insolubilized human serum proteins. In another study, a sandwich technique was used to determine whether HBsAg binds to anti-normal human serum (NHS). Partially purified and highly purified HBsAg were tested in two dilutions in normal sheep serum and in tris-HCl buffer. The binding was monitored with enzyme-labeled sheep anti-HBs. There was little evidence of binding of HBsAg to the solid phase. Electron microscopy of highly purified HBsAg in the presence of anti-NHS did not reveal any clumping of particles, but this phenomenon was very pronounced in the presence of anti-HBs. It is concluded that the presence of human serum protein-like material in HBsAg is still a matter of controversy.

507 DETECTION OF HEPATITIS IN BLOOD. (Eng.) Aach, R. D.; Lander, J. L. (Div. Gastro-
nterology, Univ. Washington, St. Louis, MO). 32
p; 1975 [available through National Technical
nformation Services, Washington, DC Document
o. PB-243 979/2WJ].

508 THE EFFECT OF LYMPHOCYTIC TRANSFER FACTOR ON HEPATITIS B SURFACE ANTIGEN-POSITIVE
HRONIC LIVER DISEASE [Abstract]. (Eng.) Jain, S.;
homas, H. C.; Sherlock, S. (Royal Free Hosp., Pond
t., London, England). *Gut* 16(10):836;1975.

509 TRANSIENT LYMPHOCYTE-MEDIATED HEPATOTOXICITY IN ACUTE VIRAL HEPATITIS [Abstract].
Eng.) Moussouros, A.; Cochrane, A. M. B.; Thompson,
. D.; Eddleston, A. L. W. F.; Williams, R. (King's
oll. Hosp., London, England). *Gut* 16(10):835-836;
975.

510 HBsAg-POSITIVE HEPATITIS: PREDOMINANCE OF T-LYMPHOCYTES IN HEPATIC INFILTRATE [Ab-
tract]. (Eng.) Miller, D. J.; Dwyer, J. M.;
latskin, G. (Dept. Medicine, Yale Univ., New Haven,
T). *Clin. Res.* 24(3):289A; 1976.

511 PRESENCE OF IMMUNE COMPLEXES IN KIDNEYS AND INTRANUCLEAR PARTICLES IN HEPATOCYTES
F NONHUMAN PRIMATES INOCULATED WITH HBsAg-CONTAIN-
NG SERUM [Abstract]. (Eng.) Hollinger, F. B.;
yorkey, F.; Eknoyan, G.; Mirkovic, R.; Dreesman,
. R.; Melnick, J. L. (Baylor Coll. Medicine, Texas
edical Center, Houston, TX). *J. Med. Primatol.*
(6):339; 1975.

512 EXPERIMENTAL HEPATITIS IN CHIMPANZEES. I. OBSERVATIONS ON THE PATHOGENESIS OF HEPATI-
IS B AFTER CHALLENGE WITH PLASMA FROM HUMAN CARRIERS.
FFECT OF β-PROPIOLACTONE-UV TREATMENT AND HEAT
REATMENT [Abstract]. (Eng.) Pert, J. H.;
rawczynski, K.; Patil, J. R.; Nowoslawski, A. (Div.
f Lab. and Res., New York State Dept. Health,
lbany, NY). *J. Med. Primatol.* 4(6):338; 1975.

513 PASSIVE IMMUNIZATION AGAINST HEPATITIS TYPE B USING HEPATITIS B SURFACE ANTIBODY
HBsAb) CONTAINING IMMUNOGLOBULIN--PRELIMINARY COM-
UNICATION OF AN UNCONTROLLED TRIAL [Abstract].
Eng.) Skinhoj, P.; Balstrup, F. (Bispebjerg Hosp.,
openhagen, Denmark). *Scand. J. Clin. Lab. Invest.*
5 (Suppl. 143):97; 1975.

514 HBsAg SUBTYPES IN FULMINANT HEPATITIS [Letter to Editor]. (Eng.) Shorey, J.
Dallas Veterans Admin. Hosp., Dallas, TX). *Lancet*
(7942):980; 1975.

7515 INFLUENCE OF A HEPATITIS VIRUS ON MACROGLOBULINEMIA REMISSION. (Eng.) Bottoni, P. (Dept. Medical Pathology I., Univ. Pavia, Pavia, Italy). *Minerva Med.* 67(11):689-693; 1976.

7516 CEREBROSPINAL FLUID CHANGES IN VIRUS HEPATITIS. (Pol.) Koba, S.; Nowak, S. (Oddzial Obserwacyjno-Zakazny Szpitala Wojewodzkiego, ul. Niska 5, 25-317 Kielce, Poland). *Wiad. Lek.* 29(8):689-691; 1976.

7517 HEPATITIS-B ANTIGEN AS A PROGNOSTIC MARKER IN ACUTE AND CHRONIC HEPATITIS [Abstract]. (Eng.) Dietrichson, O.; Nielsen, J. O. (Kommunehospitalet, Copenhagen, Denmark). *Scand. J. Clin. Lab. Invest.* 35(Suppl. 143):93; 1975.

7518 NONSPECIFIC TEST REACTIONS FOR ANTIBODIES TO HEPATITIS B SURFACE ANTIGEN IN CHRONIC HBsAg CARRIERS [Abstract]. (Eng.) Vyas, G. N.; Roberts, I.; Peterson, D. L.; Holland, P. V. (Univ. California, San Francisco, CA 94143). *Fed. Proc.* 35(3):415; 1976.

7519 PROGRESSION OF HISTOLOGICAL CHANGES IN HEPATITIS B ANTIGEN CARRIERS [Abstract]. (Eng.) Tapp, E.; Hollanders, D.; Dymock, I. W. (Univ. Hosp., South Manchester, England). *Gut* 16(10):836; 1975.

7520 FAMILIAL OCCURRENCE OF HEPATITIS B INFECTION [Abstract]. (Eng.) Helske, T. (Finnish Red Cross Blood Transfusion Service, Helsinki, Finland). *Scand. J. Clin. Lab. Invest.* 35(Suppl. 143):95; 1975.

7521 BREAST-FEEDING AND HEPATITIS B [Letter to Editor]. (Eng.) Beasley, R. P.; Stevens, C. E.; Shiao, I.-S.; Meng, H.-C. (Dept. Epidemiology and Clinical Investigation, U.S. Naval Medical Res. Unit no. 2, Box 14, APO San Francisco, CA 96263). *Lancet* 2(7944):1089; 1975.

7522 HEPATITIS-B VIRUS INFECTION OF CHILDREN BORN TO MOTHERS WITH SEVERE HEPATITIS [Letter to Editor]. (Eng.) Giraud, P.; Drouet, J.; Dupuy, J. M. (Centre d'Hemobiologie Perinatale, 53 boulevard Diderot, F 75012 Paris, France). *Lancet* 2(7944):1088-1089; 1975.

7523 HEPATITIS B ANTIGEN SUBTYPES IN NORTH-WEST ENGLAND AND NORTH WALES [Abstract]. (Eng.) Green, H. T.; Turner, G. C. (Fazakerley Hosp., Liverpool, England). *J. Clin. Pathol.* 28(9):754; 1975.

7524 EPIDEMIOLOGY OF HEPATITIS B AND PRIMARY HEPATIC CARCINOMA [Letter to Editor]. (Eng.) Trichopoulos, D.; Violaki, M.; Sparros, L.; Xirouchaki, E. (Univ. Athens Medical Sch., Goudi, Athens 609, Greece). *Lancet* 2(7943):1038-1039; 1975.

7525 CLINICAL RESULTS WITH COENZYME A IN 25 CASES OF LIVER DISEASE. (Ita.) Magaraci, G. (Regina Margherita Hosp., Messina, Italy). *Minerva Med.* 67(8):512-518; 1976.

7526 IDENTIFICATION OF HEPATITIS-B ANTIGEN [Letter to Editor]. (Eng.) Bogomoletz, W. V.; Tuttle, D. (Queen Mary's Hosp., Rochampton, London, SW 5PN, England). *Lancet* 2(7944):1089-1090; 1975.

See also, 7451, 7474, 7555.

LIVER AND BILIARY TRACT

Chronic Hepatitis

7527 CHRONIC ACTIVE HEPATITIS IN CHILDHOOD. (Eng.) Tolentino, P. (Inst. Infectious Diseases, Univ. Genoa, Genoa, Italy). *Paediatrician* 5(1/2):67-73; 1976.

The classification of chronic active hepatitis (CAH), specifically, the form that follows hepatitis B virus infection in childhood, is discussed. Hepatitis B surface antigen (HBsAg)-positive CAH is characterized by a high level of serum immunoglobulins (Ig, especially IgG and IgM) in all cases, including pediatric ones. There is also an Ig deposit at the surface of the hepatocytes, as demonstrated by immunofluorescence. There is enhanced reactivity of the T lymphocytes, both aspecific (to phytohemagglutinin, PHA) and specific (to hepatic lipoproteins). The histological aspects of the liver show an aggressive periportal and lobular inflammation by lymphocytes, similar to that of transplantation rejection. An *in vitro* cytotoxicity for hepatocytes by lymphocytes from chronic hepatitis patients has been shown, along with an increased percentage of these lymphocytes without B- and T-cell markers. It is hypothesized that there is an increased number of killer cells destroying hepatocytes. Finally, the disease responds favorably to immunosuppressive therapy. These factors establish that HBsAg-positive CAH is a progressive, self-perpetuating autoimmune disease that is triggered by virus infection and whose chronic evolution is due to different virus- and host-dependent factors. Factors that initiate the chronic evolution of acute hepatitis B are distinct from those responsible for the self-perpetuating mechanism. As a consequence, corticosteroids have different effects. They are harmful in the acute stage, impairing the immune defenses and starting a chronic evolution, but they are very useful (along with azathioprine) in the chronic stage, when immunosuppressive therapy is needed.

7528 MORPHOLOGY OF ANICTERIC PEDIATRIC INFECTIOUS HEPATITIS. 1 COMPARATIVE HISTOLOGY OF LIVER PUNCTURES IN ICTERIC AND ANICTERIC VIRAL HEPATITIS. (Ger.) Wiegand, U.; Martin, H.; Gudowski, G.; Tacke, A.; Schneeweis, B. (Kinderklink, Bereich Medizin (Charite) Humboldt Univ., 104 Berlin, Schumannstr. 20/21, E. Germany). *Dtsch. Gesundheitsw.* 31(23):1075-1081; 1976.

Morphological differentiation in pediatric icteric and anicteric viral hepatitis (VH) are described. The clinical sample consisted of 113 punch biopsy specimens from 51 anicteric (group A) and 62 speciments from 26 icteric children (group B) with VH. The average age of the children was 6 yr (2-15 yr); infants were excluded. About 70% of both groups were Australia antigen positive. Single cell necrosis and mitosis were about equal in both groups up to 2 weeks after clinical onset, but diminished thereafter. Multinucleated cells increased in weeks 2 and 3. Inflammatory infiltration of periportal fields, which peaked during the 1st week, was found equally in both groups A and B throughout the observation period. Focal proliferation of astrocytes, whose extent remained constant through all phases, was obvious in 80% of all specimens in week 7; diffuse astrocyte proliferation peaked in week 1 and continued to regress to near extinction in week 5. A slight proliferation of collagenous connective tissue began in both groups A and B during week 1 and continued to increase; it was frank in more than 60% of all specimens by week 3. Parenchymal icterus, which peaked in group B during week 2, was associated with serum bilirubin levels below 2 mg/100 ml. Siderin was significantly higher ($p<0.01$) in one-third of group B and one-tenth of group A by weeks 3 and 4. Although there is little qualitative difference between groups A and B, quantitative distinctions begin to appear in week 2. The number of necroses and mitoses in group A was lower ($p<0.01$) than in group B.

he degree of diffuse astrocyte proliferation was
igher ($p<0.01$) and the inflammatory extent of peri-
ortal fields greater ($p<0.05$) in group B than in A.
ocal astrocyte proliferation was equal. These dif-
erences disappear after week 2. Histologically
anifest differentia are mainly confined to the
arenchymal phase of disease.

529 AUTOLYMPHOCYTOTOXINS (CoCoCy) IN PATIENTS
WITH DIFFERENT FORMS OF HEPATITIS AND CIR-
HOSIS. (Ger.) Bertrams, J.; Kuwert, E.; Selmair,
.; Reis, H. E.; Wiese, W. (Laboratorien des St.
lisabeth-Krankenhauses Moltkestr. 61, D-4300 Essen,
. Germany). *Klin. Wochenschr.* 54(5):227-233;
976.

era of 282 patients with different forms of hepa-
itis and cirrhosis were screened for cold-reacting
omplement-dependent autolymphocytotoxins (CoCoCy).
hese antibodies are 19S-immunoglobulin M and have
o HLA antigen specificity. The CoCoCy occurred in
he sera of 48% of the chronic aggressive hepatitis
atients, 14% of the chronic persistent hepatitis
atients, and in 30% and 45% of two groups with
cute hepatitis. No correlation was found between
oCoCy and hepatitis B antigen (HBAg). The CoCoCy
ould also be demonstrated in 20% of an HBAg-
ositive and in 6% of an HBAg-negative control
roup. The actual serum concentration of CoCoCy was
ow. They seemed to be T-cell specific and to re-
lect the overall immunoreactivity without relation
o the specificity of the antigenic stimulus. It
s concluded that CoCoCy may be of pathogeneic and
athodynamic rather than diagnostic interest.

530 THE SERUM TRANSFERRIN LEVEL IN CHRONIC
HEPATITIS CASES. (Ger.) Ohlenschlaeger,
.; Berger, I. (Gustav-Embden-Zentrum der Biologis-
hen Chemie, Frankfurt Untersuchungsstelle, Frank-
urt, W. Germany). *Fachz. Labor.* 19(12):1173-1175;
975.

he serum transferrin (ST) levels in four types of
hronic hepatitis are reported. The test group in-
luded 141 cases of active chronic hepatitis with
low progression, 18 cases with a more rapid
rogression, 116 cases of persistent chronic hepa-
itis, and 40 patients with chronic necrotizing
epatitis. Normal ST levels, with a mean of 255.99
g/100 ml, were found in 251 patients, and depressed
evels, with a mean of 165.23 mg/100 ml, were found
n 64 patients. The lowest value obtained was 130
g/100 ml, and only in one case of chronic persis-
ent hepatitis was ST as high as 425 mg/100 ml. No
tatistical correlation could be established between
T level and hepatitis type. The liver parenchyma
as sufficient transferrin synthesis potential in
epatitis.

531 EARLY RENAL IMPAIRMENT IN CHRONIC HEPATI-
TIS. (Eng.) Gentilini, P.; Laffi, G.;
uzzelli, G.; Stefani, P.; Masi, R. (Cattedra di Patologia Speciale Medica e Metodologia Clinica 2R, Universita di Firenze, 50134 Firenze, Italy). *Rend. Gastroenterol.* 7(3):194-196; 1975.

Renal function tests, including glomerular filtration rate (GFR) and renal plasma flow (RPF), were carried out in 34 patients with chronic active hepatitis, 19 patients with active cirrhosis, 13 patients with other chronic liver diseases with portal hypertension, and 12 patients with other chronic liver diseases without portal hypertension. A selective renal arteriography and a kidney scan with ^{99m}Tc-microspheres of human albumin were also performed in 24 patients. In 35.3% of the patients with chronic active hepatitis, there were changes in RPF. The GFR was abnormal in 38.2%. The RPF and GFR were abnormal in 57.9% and 47.3%, resp., of the patients with active cirrhosis. The RPF and GFR were abnormal in 53.8% and 69.2%, resp., of those with portal hypertension, and in 75% and 91.6%, resp., of those without portal hypertension. The kidney scan showed arteriovenous shunts opening in the kidneys in 3 of 8 patients with chronic active hepatitis, in 6 of 10 patients with active cirrhosis, and in 2 of 5 patients with portal hypertension. The kidney scan was normal in the one patient without portal hypertension in whom it was carried out. The results show early renal function changes in patients with chronic active hepatitis before the onset of clinical and functional signs of cirrhosis and before water retention or increase in the levels of creatinine and blood urea nitrogen occur.

7532 INHIBITORY ACTIVITY IN SERA FROM PATIENTS WITH ACUTE AND CHRONIC HEPATITIS AND ITS CLINICAL SIGNIFICANCE [Abstract]. (Eng.) Brattig, N.; Berg, P. A. (Dept. Medicine, Univ. Tubingen, Tubingen, W. Germany). *Digestion* 12(4/6):278; 1975.

7533 ANTIBODY TO HEPATITIS B VIRUS CORE (ANTI-HBc) IN CHRONIC LIVER DISEASES [Abstract]. (Eng.) Pagliaro, L; Genova, G.; Cumia, G.; Maggiore, G.; Filippazzo, G.; Spano, C.; Dardanoni, L. (Ospedale "V. Cervello," Palermo, Italy). *Digestion* 12(4/6): 265-266; 1975.

7534 AN ORGAN-SPECIFIC AUTOANTIBODY AGAINST A LIVER-SPECIFIC MEMBRANE ANTIGEN IN HBsAg-NEGATIVE CHRONIC ACTIVE HEPATITIS (CAH) [Abstract]. (Eng.) Hopf. U.; Meyer zum Buschenfelde, K. H. (Second Dept. Internal Medicine, Univ. Mainz, Mainz, Germany). *Digestion* 12(4/6):266-267; 1975.

7535 C3 METABOLISM IN HBsAg-POSITIVE AND -NEGATIVE CHRONIC ACTIVE LIVER DISEASE (CALD) [Abstract]. (Eng.) Potter, B. J.; Elias, E.; Thomas,

H. C.; Sherlock, S. (Royal Free Hosp., London, England). *Digestion* 12(4/6):340; 1975.

7536 PLASMA PHARMACOKINETICS OF PREDNISONE AND PREDNISOLONE IN NORMAL SUBJECTS AND PATIENTS WITH LIVER DISEASE [Abstract]. (Eng.) Davis, M.; English, J.; Idio, G.; Dordoni, B.; Krasner, N.; Chakraborty, J.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 12(4/6):264; 1975.

See also, 7111, 7145, 7434, 7436, 7496, 7510, 7517.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

7537 DEOXYCHOLATE METABOLISM IN ALCOHOLIC CIRRHOSIS. (Eng.) Knodell, R. G.; Kinsey, M. D.; Boedeker, E. C.; Collin, D. P. (Univ. New Mexico, Sch. Medicine, Albuquerque, NM 87131). *Gastroenterology* 71(2):196-201; 1976.

Studies were carried out in six patients with alcoholic cirrhosis and in controls to determine the mechanism responsible for the absence of deoxycholate in the bile of cirrhotic patients. Four cirrhotic patients had no detectable deoxycholate in the bile, while the deoxycholate levels in the other two patients were 3.3 and 14.1% of the total bile acids, resp. The mean fecal excretion of ^{14}C-deoxycholate (36.3% excreted) and the calculated deoxycholate fractional turnover constants (0.102 days) and half-lives (8.7 days) in the cirrhotics were not significatly different from those of three controls; these values were similar in the cirrhotics with and without deoxycholate in the bile. A trend toward decreased ^{14}C-deoxycholate fecal excretion with decreased fractional turnover and prolonged deoxycholate half-life was seen in the cirrhotics. These data support the conclusion that the absence of deoxycholate in cirrhotic bile is not due to deoxycholate malabsorption. There was also no evidence for the rehydroxylation of deoxycholate in the cirrhotics. Large quantities of lithocholate and deoxycholate were seen in control chromatograms, while these secondary bile acids represented only a small proportion of the total fecal bile acids in the cirrhotic chromatograms; significant amounts of chenodeoxycholate and cholate were seen in addition to trisubstituted ketohydroxy bile acid peaks. Significantly decreased mean amounts of lithocholate (14.1%) and of deoxycholate (15.3%), and significantly increased amounts of chenodeoxycholate (12.1%) and additional secondary bile acids (52.6%), were seen in the cirrhotic patients, in comparison with controls (35.7%, 44.9%, 0.7%, and 17.2%, resp.). A statistically significant increase in fecal cholate excretion was not seen; two cirrhotics without biliary deoxycholate had ample amounts of fecal cholate. *In vitro* fecal inocula from both cirrhotics and controls deconjugated taurocholate. Of the total bile acids extracted from the fecal cultures of the cirrhotics without biliary deoxycholate, 42.1% was 3α,12α-dihydroxy-7-keto-5β-cholanoate, a byproduct of dehydrogenation of the 7-hydroxyl group of cholate; this was seen in only two of eight *in vitro* control incubations. In contrast to controls, there was a large amount of unmetabolized cholate and very littl deoxycholate in chromatograms of bile acids extracted from cirrhotic fecal cultures. The dehydrogenation byproduct was also present in significant quantities in the *in vivo* fecal bile acid extracts of three of four patients without biliary deoxycholate (11.0% of total fecal bile acids). It appears that the marked decrease in 7α-dehydroxylase activit of fecal bacteria of some patients with alcoholic cirrhosis results in impaired conversion of cholate to deoxycholate and explains the lack of biliary deoxycholate in these patients.

7538 GAMMA-GLUTAMYL TRANSPEPTIDASE IN ALCOHOLIC LIVER DISEASES. (Ger.) Ferenci, P.; Dragosics, B.; Pesendorfer, F. X.; Schubert, H. (I. Medizinische Universitatsklinik, Alser Strasse 4, A-1097 Vienna, Austria). *Acta Med. Austriaca* 3(2): 50-54; 1976.

The results of a comparative study of γ-glutamyl transpeptidase (GGT) and other enzymes in alcohol-conditioned and nonalcohol-associated liver disease are presented. The sample populations included 19 cases of steatosis, 7 of fatty livers, and 43 of cirrhosis in the alcohol group, and 28 cases of steatosis and 43 of cirrhosis in the nonalcohol group. GGT was elevated in the steatosis patients of both groups, with a combined average of 102 U/1; BSP retention averaged 10.9%. The transaminases were normal in 7/28 of the nonalcohol group and in 2/19 of the alcohol group. Average steatosis GGT values were 145 U/1 in the alcohol group and 73 U/1 in the nonalcohol group. The GGT/SGPT quotient was 6.9 for the alcohol group and 2.2 for the nonalcohol group. Alkaline phosphatase (AP) was increased only negligibly in 4/28 of the nonalcohol group and 2/19 of the alcohol group, while pseudocholinesterase (PCE) was elevated over 4,000 U/l in a majority of the patients with steatosis not associated with alcohol. In fatty liver conditions, the average GGT was 896 U/l for the alcohol group, while glutamic oxaloacetic transaminase (GOT) was 54 U/l, GPT was 19 U/l, and the GGT/GPT quotient was 53.7. AP was 25% higher than normal in 6/7 of the alcohol group. Among the 86 cirrhotics of both groups, the average enzyme levels in U/l were GGT, 241; GOT, 48; GPT, 30; and AP, 81. The average in U/l for GGT were 334 in the alcohol group and 110 in the nonalcohol group. Average transaminase differences were negligible. In a subgroup of patients with continuing alcohol abuse, the GGT levels averaged 477 U/l in contrast to 68 U/l in a subgroup after a 3-month abstinence. The transaminases and AP were also lower in the abstinent sample. The highest GGT/GPT quotients were found among the continuing alcoholics at 30.7, with 5.9 after 3 months abstinence. Average quotients were 4.5 for 26 postcirrhotics, 3.2 for 13 cases of cryptogenetic cirrhosis, and 24.7 for 4 biliary cirrhotics. Average AP levels in biliary cirrhosis were 10-fold higher than normal. In the alcohol group, 35/43 and 8/43 had average GGT-GPT quotients above and below 5, resp.; in the nonalcohol group, 13/43 and 30/43 had quotients above and below 5, resp. Average values in U/l for alcohol cirrhosis included GGT, 307; GOT, 62; GPT, 31; and AP, 33, with a GGT/GPT quotient of 20.2. Although elevated GGT is not specific for an alcoholic-related condition, the highest levels are found in alcoholics and in cases of cholestasis.

7539 ALDOSTERONE ELIMINATION AND HEMODYNAMIC RELATIONSHIPS IN CHRONIC LIVER DISEASE. (Eng.) Haug, T. O.; Muller, O. (Univ. Inst. Respiratory Physiology, Oslo, Norway). *Scand. J. Clin. Lab. Invest.* 35(Suppl. 143):2; 1975.

7540 CLINICAL AND HORMONAL CHANGES IN MALE PATIENTS WITH CHRONIC LIVER DISEASE. (Eng.) Mowat, N. A. G.; Edwards, C. R. W.; Fisher, R.; McNeilly, A. S.; Anderson, D. C.; Green, J. R. B.; Dawson, A. M. (St. Bartholomew's Hosp., London, England). *Q. J. Med.* 44(176):631-632; 1975.

7541 IDENTIFICATION OF APOLIPOPROTEIN A-I AND C DEFICIENCY IN ALCOHOLIC HEPATITIS (AH) [Abstract]. (Eng.) Hawkins, H.; Davidson, O.; Ragland, J. B.; Sabesin, S. M. (Div. Gastroenterology, Univ. Tennessee, Memphis, TN). *Clin. Res.* 24(3): 432A; 1976.

7542 TYPES OF COLLAGEN IN HUMAN ALCOHOLIC CIRRHOTIC LIVERS [Abstract]. (Eng.) Rojkind, M.; Giambrone, M.-A. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *Fed. Proc.* 35(7):1519; 1976.

7543 CARBOHYDRATE METABOLISM IN PATIENTS WITH ALCOHOLIC LIVER CIRRHOSIS. (Eng.) Kinalska, I.; Raimer, M. (Inst. Internal Diseases, Medical Acad., Bialystok, Poland). *Mater. Med. Pol.* 7(3): 200-203; 1975.

7544 HYALINE BODIES IN LIVER BIOPSIES OF CHRONIC ALCOHOLICS [Abstract]. (Eng.) Bruguera, M.; Bertran, A.; Bombi, J. A.; Rodes, J. (Hospital clinico y provincial, Universidad de Barcelona, Barcelona, Spain). *Digestion* 12(4/6):291; 1975.

7545 ASYMPTOMATIC LIVER DISEASE IN ALCOHOLICS [Abstract]. (Eng.) Bruguera, M.; Bordas, J. M.; Rodes, J. (Hospital clinico y provincial, Universidad de Barcelona, Barcelona, Spain). *Digestion* 12(4/6):291-292; 1975.

See also, 7012, 7146, 7434, 7525.

LIVER AND BILIARY TRACT

Cirrhosis

7546 RESPONSES TO TREATMENT CAN DIFFERENTIATE CHRONIC ACTIVE LIVER DISEASE WITH CHOLANGITIC FEATURES FROM THE PRIMARY BILIARY CIRRHOSIS SYNDROME. (Eng.) Geubel, A. P.; Baggenstoss, A. H.; Summerskill, W. H. J. (Mayo Clinic, Foundation and Medical Sch., Rochester, MN). *Gastroenterology* 71(3):444-449; 1976.

The value of response to treatment as an indicator of the correct diagnosis of either chronic active liver disease (CALD) or primary biliary cirrhosis (PBC) syndrome is reported. Of 125 patients fulfilling pre-established criteria for severe CALD and enrolled in a prospective trial of treatment, 15 presented with morphological features consistent with the diagnosis of both CALD and PBC syndrome. Clinical, biochemical, and immunoserological studies failed to distinguish fully between these conditions.

In contrast, the early response to treatment with prednisone and/or azathioprine identified two different groups of patients. Five patients failed to respond, whereas 10 improved, and this was followed by resolution of all clinical, biochemical, and morphological evidence of disease activity. Analysis of the initial chemical findings and cumulative bile duct counts from multiple biopsies correlated failure to respond with biochemical and morphological features more consistent with PBC than CALD. Responses to treatment can therefore be utilized, when indicated, for differentiating CALD with cholangitic features from PBC.

7547 HEPARIN THERAPY IN LIVER CIRRHOSIS. (Ger.) Klein, H.-J.; Falkensammer, Ch.; Gauss, P.; Fischer, M. (Zentrallabor, Krankenhaus Lainz, Wolkersbergenstrasse 1, A-1130 Vienna, Austria). *Acta Med. Austriaca* 2(3):99-100; 1975.

The relation between consumption coagulopathy with or without secondary fibrinolysis and liver parenchymal embarrassment is examined. The clinical sample included 80 patients with liver cirrhosis and signs of coagulopathy. Treatment included administration of 6,000-10,000 IU of depot heparin, divided into 3-4 daily doses. Monitoring was performed at 2-day intervals. Directly after initiation of therapy, the fibrinogen level increased and then normalized within 4 days. After an initial delay, the thrombocyte count increased, and then normalized within 6 days. The normotest increased 35%, but there was little change in the thromboplastin time and thrombin coagulase. Among the 80 patients, 60% had an initially abnormal normotest value that increased by an average of 35% after 8 days of heparin therapy; half of the cases with an abnormal thromboplastin time returned to normal. In the 48% who had had a low fibrinogen level, an increase on the average of 45% (110-210 mg%) was noted 8 days after the initiation of heparin therapy. Thrombin coagulase and thrombocyte counts were normalized in 60-65% of the cases. Thus, heparin amelioration is short-term and pathological levels resume after 14 days.

7548 MANAGEMENT OF GASTROINTESTINAL BLEEDING IN CIRRHOTIC PATIENTS. (Eng.) Rueff, R.; Benhamou, J. P. (No affiliation given). *Clin. Gastroenterol.* 4(2):425-438; 1975.

The current management of gastrointestinal bleeding in cirrhotic patients is discussed. Approximately one-third of patients will stop bleeding without any specific treatment or with gastric ice-water washings only, and for them careful observation is sufficient. Three procedures have been used with comparable results in the treatment of active, moderate bleeding: esophageal tamponade, systemic vasopressin, and selective intraarterial vasopressin. Aggressive treatment (sclerosis of esophageal varices, varix ligation, transesophageal ligation, and emergency portacaval shunt) is indicated in cases of life-threatening hemorrhage. The relative efficacies of these procedures will have to be determined in controlled studies. It is suggested that an *a priori* management strategy be defined for all cirrhotic patients hospitalized for gastrointestinal hemorrhage and that controlled studies be used to verify its value.

7549 CURRENT MANAGEMENT OF ESOPHAGEAL VARICES. (Eng.) Webster, M. W. (Dept. Surgery, Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Surg. Clin. North Am.* 55(2):461-473; 1975.

The pathophysiology, etiology, diagnosis, and treatment of esophageal varices are reviewed, and several surgical techniques for portal decompression are summarized. Endoscopy is the preferred initial step in the evaluation of acute upper gastrointestinal hemorrhage. Selective arteriography is also very useful in its diagnosis and treatment. Splenoportography allows excellent visualization of the portal circulation and is surprisingly safe. Barium contrast studies of the upper gastrointestinal tract continue to be the mainstay of routine investigations, but there are several disadvantages: adequate studies may be difficult in the actively bleeding patient, esophageal varices are frequently not visualized, and there is a high rate of false-negative results in patients with acute gastritis and active peptic ulcer. Evaluation of liver function and percutaneous liver biopsy should be carried out if possible. A fairly standard therapeutic approach to portal hypertension appears to be emerging. In patients with benign extrahepatic portal obstruction, portal decompression by a mesocaval shunt is highly successful, with few complications. Among cirrhotics, only portal decompression currently offers long-term relief from recurrent hemorrhage in patients who have bled. Prophylactic decompression is not indicated in patients who have never bled. Patients with intractable ascites or hypersplenism secondary to portal hypertension rarely require decompression. Intra-arterial infusion of vasopressin has been used successfully to delay the time of decompression and thus improve mortality rates in cases of acute massive upper gastrointestinal bleeding. At present, there is little objective data to favor any particular type of central shunt. Current questions center around patient selection and timing of the procedure. The primary goal is to find ways of avoiding hepatic encephalopathy and the adverse effects of deprivation of portal flow on the liver, through either selective decompression of the variceal bed or portal arterialization. Liver transplantation may ultimately be the answer.

7550 PORTAL SHUNTS. CRITICAL CONSIDERATIONS ON THE SELECTION OF THE SHUNT METHOD. (Ger.) Esser, G. (Chirurgische Klinik, Krankenhaus Maria Hilf, D-405 Monchengladbach 1, Sandradstrasse 43, W. Germany). *Chirurg* 46(9):400-405; 1975.

Conventionally accepted portal shunt surgery for relief of esophageal varice bleeding is reviewed. The following three main classes are listed: portacaval anastomosis (PA), either end-to-end or side-to-side; splenorenal anastomosis (SA), lateral end-to-side; and mesentericocaval anastomosis (MA), side-to-side. The world literature to 1972 shows the surgical mortality to have been 15.8% for PA and 11%

for SA; the 5-yr (and 10-yr) mortality rates were 58.6% (and 89%) for PA and 42% (and 70%) for SA; the number of bleeding recurrences was 10% for PA and 25.8% for SA; and the number of encephalopathies was 16.7% for PA and 11.2% for SA. The author, however, places the incidence of hepatoportal encephalopathy consequent to PA at 27%-35%. The less than favorable survey statistics on lateral SA are said to be unrepresentative since, more than any other intervention, the success of lateral SA depends on the skill and judgment of the surgeon in anticipating the subsequent curvature of the splenic vein. MA is considered standard, though seldom used. Its most favorable prognosis depends on laterolateral anastomosis with the inferior vena cava. More rarely used anastomoses include cavomesenteric, coronariocaval, central splenorenal, omphalocaval, and mesenterirenal. Portacaval shunt with arterialization of the portal vein stump with the hepatic artery, prostheses, or saphenous bypass--the author uses a purely abdominal approach--is not construed as especially valuable, since the incidence of postoperative encephalopathy is high. Central splenorenal anastomosis is most prophylactic of encephalopathy and, because of the low surgical mortality of 7.6% has been adopted as the method of choice.

7551 PORTAL-SYSTEMIC SHUNTS IN PATIENTS WITH CIRRHOSIS. THE NEED OF CONTROLLED CLINICAL TRIALS. (Eng.) Rueff, B.; Maillard, J. N. (Veterans Admin. Hosp., West Haven, CT 06516). *Digestion* 11(5/6):414-427; 1974.

Current indications for portasystemic shunts in cirrhotic patients are reviewed. For patients with intractable ascites, a side-to-side portacaval shunt has been used more frequently than an end-to-side shunt, but there have been no controlled studies comparing the advantages of the two or the treatment results. Prophylactic portacaval shunts have been studied in three controlled trials, and they have been judged to be without benefit. The value of emergency portacaval shunts has been difficult to evaluate because of the high postoperative mortality and the unknown mortality in similar patients who have not been treated surgically. Elective portasystemic shunts significantly decrease the frequency of digestive hemorrhage, but they also significantly increase the frequency of severe hepatic encephalopathy. The factors that should be analyzed in evaluating elective portasystemic shunts include criteria for selection of patients for surgery, the choice of surgical procedure (total portal decompression, end-to-side portacaval shunt and arterialization of the portal vein, partial decompression of the portal system, and selective decompression), the timing of surgery relative to hemorrhage, and the varying techniques of individual surgeons. Because of the lack of controlled clinical trials, the usefulness of portasystemic shunts in patients with cirrhosis and ascites is concluded to be questionable.

7552 CLINICAL-MORPHOLOGICAL EVALUATION OF PORTOGRAPHY IN PATIENTS WITH PORTAL HYPERTENSION SYNDROME. (Rus.) Ershov, Yu. A.; Kiseleva, N. P.; Chubarova, P. V.; Odina, K. M. (All-Union Scientific Res. Inst. Clinical and Experimental Surgery, Moscow, USSR). *Khirurgiia (Mosk.)* (10):67-72; 1975.

Clinical-morphological assessment of splenoportography in 104 patients with different types of portal hypertension is presented. Liver biopsy was performed in all cases at surgery, and additional portography was done in 42 cases. Portal cirrhosis was diagnosed in 28 patients, postnecrotic cirrhosis in 12, mixed cirrhosis in 21, cirrhosis of unknown type in 4, hepatitis in 4, vascular changes (Budd-Chiari syndrome and similar, usually moderate changes) in 24, and cholangitis in 5; the liver was normal in 6 cases. The portal hypertension was found to be intrahepatic in 64 cases, extrahepatic in 20, mixed in 15, and posthepatic in 5 cases. The analysis of the clinical and morphological data indicates that portography permits an assessment of the degree of the vascular decompensation, but not of the structural changes of the hepatic parenchyma in patients with intrahepatic hypertension. In patients with extrahepatic hypertension, portography yields valuable information on the vascular architectonic of the prehepatic segment of the portal vein. The comparison of the portographic and clinical-morphological data shows the absence of specific morphological signs of the different types of blockade of the portal circulation in extrahepatic portal hypertension.

7553 SURGICAL MANAGEMENT OF PORTAL HYPERTENSION. (Eng.) Bengmark, S. (No affiliation given). *Clin. Gastroenterol.* 4(2):395-423; 1975.

Current practices in the management of portal hypertension are reviewed. The two great advantages of classical portasystemic shunts are that they prevent rebleeding and they eliminate ascites in cirrhotic patients. However, the high incidence of hepatic encephalopathy after these procedures constitutes a serious problem. Alternatives to classical portasystemic surgery include selective decompression of the esophageal varices and selective devascularization of the esophagus and upper stomach. Surgical stimulation of the "natural" development of collaterals may contribute to the improvement of surgery. New types of shunt operations include distal splenorenal shunt, left gastric vein-vena cava shunt, side-to-side splenorenal shunt, and interposition mesocaval shunt. The latter appears to be the most suitable for emergency operations. Transposition of the spleen to the s.c. layer has been effective in the rat, and among 10 patients undergoing this procedure, 1 died of heart failure and the other 9 have not rebled during observation periods of 14-25 months. None developed encephalopathy. Acute operation of bleeding varices is undesirable but sometimes necessary. Acute sclerotherapy is a promising alternative to surgery in patients with bleeding esophageal varices. Local decompression by devascularization in bleeding cases appears to produce better results than an acute shunt operation. Prophylactic conventional portacaval shunts offer no advantages, but prophylactic selective decompression remains to be studied. Ascites *per se* is not an indication for a portasystemic shunt. The primary approach to the treatment of encephalopathy is medical, and surgery should be used only in extreme cases.

7554 THE HEPATIC CIRCULATION AND PORTAL HYPERTENSION. (Eng.) Leevy, C. M.; Kiernan, T. (No affiliation given). *Clin. Gastroenterol.* 4(2):381-394; 1975.

The role of pathophysiological abnormalities of hepatic circulation and portal hypertension in the growing morbidity and mortality among patients with liver disease is reviewed, along with diagnostic and therapeutic measures. The principal pathological results of functional and/or structural changes in the vascular bed of the liver are alterations in the metabolism of drugs and foodstuffs, the development of esophageal varices, and decreased oxygenation of the liver cells. Clinical investigations include radiological visualization of the hepatic vascular bed for determination of liver size, the presence of space-occupying lesions, and identification of vessel blockage and collateral or altered flow patterns. In addition, portal pressure and total hepatic and portal blood flow should be determined in all cirrhotic patients with endoscopic evidence of esophageal varices. These data allow more rational decisions regarding medical or surgical management. However, their impact on the morbidity and mortality of patients with advanced portal hypertension has been essentially nil. A significant effect could be realized if the information were applied in the asymptomatic phase of portal hypertension to prevent its progression. Adequate perfusion and oxygenation in the treatment of liver disease and its complications are emphasized. They necessitate the preservation of substrates and enzymes necessary for adequate oxygen supply, avoidance of procedures or therapy that diminish portal or arterial blood flow, and avoidance of injury that would alter the microcirculation or interfere with hepatocyte uptake capacity.

7555 DYNAMIC OF THE TITERS AND TYPES OF ANTIBODIES TO DNA IN DIFFERENT FORMS OF HEPATITIS AND LIVER CIRRHOSIS. (Rus.) Prozorovskaya, N. N.; Baleva, M. P.; Mironova, I. S.; Belokrinitsky, D. V.; Semendyaeva, M. E. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (7): 46-51; 1975.

Dynamic changes in the titers and types of DNA were studied in 43 patients with liver cirrhosis (group 1), in 37 patients with hepatitis (group 2), and in 15 patients with various hepatobiliary diseases (residual viral hepatitis, fatty degeneration, hyperbilirubinemia, cholecystitis, and liver cancer, group 3). Most patients were examined 3-34 times in 1-4 yr, for a total of 365 tests. Antibodies to DNA were not found in five patients in group 1, including patients with portal alcoholic and postnecrotic cirrhosis. Low DNA antibody titers were found in 15 patients with postnecrotic cirrhosis, portal hypertension, and after long-term corticosteroid and cytostatic therapy. The DNA antibody levels decreased in 5, and disappeared in 15 patients in group 1 under therapy. No DNA antibodies were found in eight patients in group 2, low titers were found in three. In group 3, DNA antibodies were found in four patients. The incidences of antibodies of type 1, 2, and 3 were 75, 43, and 5 of 123 tests in group 1, resp.; 123, 34, and 15 of 172 in group 2, resp.; and 3, 1, and 0 of 4 in group 3, resp. Antibodies of types 2 and 3 were predominant during the exacerbation of liver cirrhosis, and type 1 antibodies became prevalent during immunosuppressive therapy. The presence of antibodies to native DNA in the serum of patients exhibiting marked clinical-morphological and highly persistent biochemical activity suggests that antibodies to DNA are a specific indication of destructive changes.

7556 COURSE OF THE PLASMA HISTAMINE CONCENTRATIONS IN THE VENOUS BLOOD AND IN THE PREHEPATIC AND POSTHEPATIC AREAS IN NORMAL SUBJECTS AND IN PATIENTS WITH CIRRHOSIS. (Ger.) Stopik, D.; Beger, H. G.; Hampel, K. E.; Baumgarten, C. (No affiliation given). *Z. Gastroenterol.* 14(Suppl.):236-237; 1976.

The pattern of venous histamine concentrations in chronic progressive liver deficit is reported. The test subjects included 16 patients with unexceptional livers and 11 patients with progressive cirrhosis. Plasma histamine was determined by ion-exchange chromatography and fluorimetry. Plasma histamine in ng/ml for normal subjects was 0.7; for patients with cirrhosis (including those with esophageal varices and portacaval shunt), 1.2; and in patients with fatty liver (I and II), 0.7. The plasma histamine concentrations in cirrhosis was significantly elevated above normal ($p<0.001$); the rate of elimination in cirrhotic patients was significantly lower (41%) than the elimination rate (68%) observed in normal subjects. Participation of elevated plasma histamine levels in hepatogenic gastroduodenal ulcers and in the altered hemodynamics of cirrhosis should be assumed.

7557 EFFECT OF Di-L(+)-ORNITHINE-α-KETOGLUTARIC ACID ON AMMONIA AND LIPID METABOLISM IN PATIENTS WITH CIRRHOSIS AND CONCOMITANT HYPERAMMONEMIA. (Ger.) Leinweber, W.; Goldberg, P.; Erb, W. (Zentrum der Innere Medizin der Universitat, Theodor-Stern-Kai 7, D-6000 Frankfurt/M. 70, W. Germany). *Med. Klin.* 71(24):1043-1046; 1976.

The effect of di-L(+)-ornithine-α-ketoglutaric acid (OKA) on elevated ammonia and lipids in patients with liver cirrhosis is described. The clinical sample consisted of 25 cirrhotics, including 22 with portal hypertension. OKA, 15 g, i.v., was infused during 90 min. The serum triglycerides and cholesterol, in mg%, fell insignificantly from 133 to 114 and 188 to 167, resp. β-Hydroxybutyric acid also decreased from 0.37 to 0.23 mg% and the free fatty acids declined from 854 to 617 mEq/l; both of these changes were significant. Blood sugar was 104-105 mg%; urea was 34-35 mg%. The ammonia level fell from 147 μg% to a normal 111 μg%; this decrease was significant, The outcome of conventional 40 g to 60 g daily therapeutic doses of OKA should be even more effective. The loss in free fatty acids could be explained by an increased breakdown of the free fatty acids, by their increased incorporation into triglycerides, or by inhibition of lipolysis. Only the latter fits the data, but it is not known whether the OKA effect is direct or indirect.

7558 INTESTINAL BACTERIA AND PROTEIN METABOLISM IN HUMAN LIVER CIRRHOSIS.

(Eng.) Muting, D.; Reikowski, H.; Arfeen, N. (Medical Dept., Univ. Hosp., Homburg/Saar, W. Germany). *Am. J. Proctol.* 26(5): 41-50; 1975.

The role of toxic protein metabolites in the development of cirrhosis and hepatic coma was studied in 220 patients with liver cirrhosis. Of these, 102 had no signs of portal hypertension; 118 had severe portal hypertension, 72 in hepatic coma. The blood ammonia level tended to be elevated in patients with hepatic coma, but since it was also normal in some of these patients, other toxic factors were apparently etiologic. *In vitro* experiments indicated that *Escherichia coli* produced the greatest amount of ammonia and free phenols 12 hr after inoculation of nutrient medium, but *Proteus vulgaris* produced the greatest amount after 24 hr. Neither organism produced detectable indican. *E. coli* synthesized p-hydroxyphenylacetic and p-hydroxyphenyllactic acids, and *P. vulgaris* produced p-hydroxyphenyllactic and homovanillic acids. After bleeding from esophageal varices occurs, the highest ammonia level is found at 12-24 hr. In the 39 patients studied, about 50% of the arterial ammonia was detoxified in the brain, as determined by arterial and venous concentrations of ammonia. The amount of ammonia detoxified by the brain was inversely related to the degree of hepatic cirrhosis. There was also a significant difference in inflow and outflow concentrations of free phenols in the brain. In hepatic coma, the concentrations of ammonia and free phenols were the same in arterial and venous blood from the brain. The therapeutic implications of the results include an initially protein-free diet, high enemas to eliminate blood as a source of toxic metabolites, and high doses of neomycin. The latter may be substituted by an oral intake of physiological intestinal bacteria (e.g., *Bacterium bifidum*) or its cofactor (lactulose). Oral feeding of *B. bifidum* milk in 40 cirrhotics reduced blood ammonia and free phenols significantly. Oral lactulose (50 g/day) also significantly decreased blood ammonia and free phenols.

7559 INDIAN CHILDHOOD CIRRHOSIS.

(Eng.) Nayak, N. C.; Ramalingaswami, V. (No affiliation given). *Clin. Gastroenterol.* 4(2):33-349; 1975.

The clinical, pathological, and etiological characteristics of Indian childhood cirrhosis (ICC) are reviewed. The disease is confined almost exclusively to one geographical area and appears to have a familial incidence. The early stage of ICC is characterized by vague gastrointestinal symptomatology, but in the intermediate stage, ascites, abdominal distention, and hepatosplenomegaly are prominent. The advanced stage is accompanied by progressive deterioration in hepatic function and, less commonly, gastrointestinal bleeding or secondary infection. The histopathological findings are described. Hepatocellular hyaline is a frequent and diagnostic morphologic finding. A peculiar lack of regenerative potential accounts for the fatality of ICC, more than the liver cell damage itself. α-Fetoprotein has been identified in 45% of children with ICC, compared to 7% of normal children. Immunoglobulins (Ig), especially IgM, are elevated in the serum. Malnutrition and the defects of carbohydrate and protein metabolism have been eliminated as etiologic factors. The implication of mycotoxin has been suggested by some studies, while in others a viral etiology has been suggested. The hypothesis is advanced that ICC may have a multifactorial basis. It is suggested that this disease probably occurs in the milieu of a functionally immature hepatocyte and is manifest only after the triggering action of an environmental agent, either a toxin or a virus.

7560 ENDOTOXEMIA IN LIVER CIRRHOSIS.

(Ger.) Liehr, H.; Gruen, M.; Brunswig, D.; Sautter, Th. (No affiliation given). *Z. Gastroenterol.* 14 (Suppl.):234-235; 1976.

The frequency and course of endotoxemia in liver cirrhosis is explored. The clinical subjects included 29 cirrhotic patients with evidence of intestinal endotoxins. Endotoxemia (ETX) was already present in 20 patients at the time of hospital admission. In the patients in whom there was no bleeding from esophageal varices (20 patients), functional renal failure (oliguria and retention), encephalopathy, and clotting disturbances related to metabolic disorders were associated with ETX in 67% of the cases and a pyrogenic response (fever or leukocytosis) was concomitant with ETX in 80% of the cases. ETX was found in six patients with bleeding esophageal varices. A coincidence of clotting dysfunction and pyrogenicity occurred in 100%, renal failure in 66%, and encephalopathy in 57% of the ETX patients. ETX must be considered clinically relevant in the pathogenesis of chronic liver disease.

7561 FUNCTIONAL RENAL FAILURE (FRF) IN CIRRHOSIS OF THE LIVER AND LIVER CARCINOMA.

(Eng.) Vesin, P.; Traverso, H. (31 rue de Moscou, 75008 Paris, France). *Postgrad. Med. J.* 51(598):489-491; 1975.

Functional renal failure (FRF) in liver cirrhosis and liver carcinoma, bleeding-induced FRF, and diuretic-induced FRF are discussed, and pertinent literature is reviewed. Bleeding-induced FRF is common following gastrointestinal bleeding. Azotemia and oliguria are the main findings, and refilling the vascular space rapidly leads to regression of azotemia; a significant urine output is evidence of the arrest of bleeding and recovery of renal irrigation. Although the clinical and biological findings in diuretic-induced FRF are similar to those in spontaneous FRF (moderately increased azotemia and creatininemia and moderate hyperkalemia), the prognosis is better in the former entity; functional recovery with increase in the plasma volume and glomerular filtration rate can be achieved following the administration of plasma expanders. In terminal FRF, oliguria, hyponatremia, relative hypovolemia, impairment of the glomerular filtration rate, and impairment of the renal plasma flow are much more conspicuous than in diuretic-induced FRF. The clinical course is usually fatal within weeks or months. In terminal FRF, restoration of the plasma volume is difficult to achieve or maintain and is not accompanied by regression of FRF. A major role of effective plasma volume decrease occurs in the development of terminal FRF. The hemodynamic changes in terminal FRF in patients with primary or metastatic liver carcinoma are similar to those seen in cirrhotic patients with terminal FRF. The differential diagnosis of FRF from chronic nephritis is usually easy. Terminal FRF develops a long time after the initial diagnosis of cirrhosis; oliguria sets in earlier; azotemia is less marked, as are creatininemia and hyperkalemia; and the urea concentration in the urine is higher in FRF than in chronic nephritis. The following modes of treatment in the three types of FRF are recommended, although they are ineffective in most cases of terminal FRF: cessation of diuretic administration; blood volume expansion by means of blood, plasma, plasma expanders (especially human serum albumin deficient in salt), and ascites infusion; water intake restriction; and dietary potassium restriction. Vasodilators or sympathomimetic amines are useless.

7562 THE DEVELOPMENT OF CIRRHOSIS IN WILSON'S DISEASE. (Eng.) Sternlieb, I. (No affiliation given). *Clin. Gastroenterol.* 4(2):367-379; 1975.

The pathogenesis, morphological changes, clinical picture, diagnosis, prognosis, and treatment of Wilson's disease are reviewed. The defect in the biliary excretion of copper in patients with the disease has been localized to the hepatocellular lysozomes. Histological changes in liver biopsy specimens are recognizable long before clinical manifestations are apparent, and the evolution of these changes from steatosis, with fine or large droplets of triglycerides in the hepatocytes, to ultimate cirrhosis is summarized. Symptoms generally appear during adolescence. By the time overt signs or complications of liver disease are present, the pathological process has generally progressed to cirrhosis. The neurological, psychiatric, and ocular manifestations are relatively late developments and are always associated with cirrhosis. The combination of deficiency of serum ceruloplasmin and markedly elevated hepatic copper concentration is diagnostically pathognomonic for Wilson's disease. Untreated, the disease carries a poor prognosis, and the progressively fatal course is characterized by chronic hepatic insufficiency, fulminating hepatic failure, or bleeding from esophageal varices. If therapy is started before the irreversible pathological changes, hepatic function improves in the majority of patients, regardless of the presence of cirrhosis. Bleeding esophageal varices, however, is an ominous sign. Treatment consists of D-penicillamine, 1-2 g/day in divided doses before meals and at bedtime. Major elective surgical procedures should be avoided in these patients. The importance of early diagnosis and institution of treatment is emphasized.

7563 CLINICAL AND EXPERIMENTAL STUDIES ON CIRRHOSIS OF THE LIVER. (Eng.) Okabe, N.; Shimokawa, Y.; Kaneto, A.; Moriyama, M.; Arishima, T.; Jinnouchi, S.; Kuwahara, S.; Saito, H. (Kurume Univ. Sch. Medicine, Kurume, Japan). *Jpn. J. Med.* 13(4):301-302; 1974.

7564 CORRELATION BETWEEN GASTRIC ACID OUTPUT AND LIVER FUNCTION TESTS IN HUMAN CIRRHOSIS OF LIVER. (Eng.) Pimparkar, B. D.; Basantani, G. K.; Mehta, J. M.; Bhalerao, R. A.; Donde, U. M. (K.E.M. Hosp., Bombay 12, India). *Indian J. Med. Sci.* 29(1): 1-4; 1975.

7565 PLASMA NEUTRAL AMINOACIDS AND TRYPTOPHAN IN CIRRHOSIS [Letter to Editor]. (Eng.) Munro, H. N.; Fernstrom, J. D.; Wurtman, R. J. (Dept. Nutrition and Food Science, Massachusetts Inst. Technology, Cambridge, MA 02139). *Lancet* 2(7931):419; 1975.

7566 LYMPHOVENOUS ANASTOMOSIS FOR INTRACTABLE ASCITES IN CIRRHOSIS OF THE LIVER. (Eng.) Udwadia, T. E. (Cook's Building, D. Naoroji Road, Bombay 1, India). *Int. Surg.* 60(10):537-539; 1975.

7567 SOME ASPECTS OF IRON METABOLISM IN BILHARZIAL LIVER CIRRHOSIS. (Eng.) El-Schobaki, F. A.; Morcos, S. R.; El-Ahmady, L.; Ageeb, M. (Natl. Res. Centre, Dokki, Cairo, Egypt). *J. Egypt. Med. Assoc.* 57(1/2);49-56; 1974.

7568 STUDY OF THE THROMBOTIC TENDENCY IN BILHARZIAL HEPATIC FIBROSIS. (Eng.) Saifi, M. F.; Salam, R. A.; Shalaby, B.; El-Marsri, S. A.; Zaki, S. A.; Demian, J. (Faculty Medicine, Cairo Univ., Cairo, Egypt). *J. Egypt. Med. Assoc.* 57(1/2):65-79; 1974.

7569 ECTOPIC LIVER LOBULE WITH PORTAL CIRRHOSIS. (Eng.) Angquist, K.-A.; Boquist, L.; Domellof, L. (Dept. Surgery, Univ. Umea, Sweden). *Acta Chir. Scand.* 141(3):238-241; 1975.

7570 IMMUNOLOGICAL STUDY ON CIRRHOSIS AND NON-CIRRHOTIC PORTAL FIBROSIS OF LIVER. (Eng.) Biswas, S. K.; Sengupta, K. P. (Inst. Postgraduate Medical Education Res., Calcutta, India). *Indian J. Med. Sci.* 29(2/3):51-53; 1975.

7571 PERCUTANEOUS, TRANSHEPATIC CATHETERIZATION AND SCLEROSIS OF BLEEDING VARICES [Abstract]. (Eng.) Scott, J.; Long, R.; Dick, R.; Sherlock, S. (Royal Free Hosp., Pond St., London NW3, England). *Gut* 17(5):390; 1976.

See also, 7111, 7133, 7138, 7145, 7146, 7434, 7436, 7444, 7460, 7519, 7525, 7529, 7533, 7536, 7539, 7540.

Gallbladder and Biliary Tract Diseases

7572 DISCONNECTION OF THE AMPULLA OF VATER. (Eng.) Corlette, M. B. (Symmes Hosp., Arlington, MA). *Surg. Gynecol. Obstet.* 141(6):915-918; 1975.

A rare case of disconnection of the ampulla of Vater complicating gastric resection is reported, and a discussion of the causes, prevention, and surgery of choice for its reconstruction is presented. The patient, a 62-yr-old man with a long history of duodenal ulcer disease, underwent emergency operation because of bleeding and obstruction. The ulcer penetrating the pancreas was accompanied by marked scarring, but dissection was carried out distal to the ulcer, and the duodenum was closed with no apparent difficulty; a gastrojejunostomy was then constructed. On the 10th postoperative day, he was acidotic, debilitated, and febrile; a fistulogram demonstrated complete disconnection of the papilla of Vater. At reoperation, the papilla of Vater was found projecting from the pancreas, just cephalad to the closed duodenal stump. A Roux-en-Y limb was brought up, and the open end was anastomosed to the pancreatic tissue about the papilla. A silicone rubber tube was brought out through a separate hepaticotomy, and a small silicone catheter was passed through the abdominal wall and the wall of the Roux-en-Y limb and left near, but not transversing, the papilla. The convexity of the limb was allowed to fall loosely near the porta hepatis, so that if stenosis should occur at the papilla, a hepatico-Roux-en-Y jejunostomy would be simple to perform. To lead the bile back through the gastrojejunal anastomosis, a side-to-side Roux-en-Y to afferent jejunal limb anastomosis was performed above a barrier on the Roux-en-Y limb. Healing of all anastomoses occurred without leak. The patient recovered and remains asymptomatic after 10 months.

7573 HEMOBILIA AS A SPECIAL TYPE OF GASTROINTESTINAL BLEEDING. (Ger.) Schildberg, F. W.; Witte, J.; Heberer, G. (Chirurgische Klinik, Univ. Munchen, 8000 Munich 2, Nussbaumstr. 20, W. Germany). *Dtsch. Med. Wochenschr.* 101(19):743-748; 1976.

A retrospect analysis of nine patients with hemobilia (HB) is presented. There were three men, 24-56 yr of age, and six women, 24-66 yr of age. The initial trauma was cholecystectomy 5-6 weeks previous to HB symptoms in two patients. The pathoanatomy was hepatic artery aneurysm or hematoma and the symptomatology included hematemesis (HM), melena (ME), icterus (IC), fever, and pain. Diagnosis was via aortography (AG) or celiacography (CG) and therapy was aneurysm resection with vessel ligation. One patient has survived 18 yr, the other died from postoperative infection. The initial insult in another patient was Billroth II resection, with cholecystectomy and common duct revision. Symptoms included HM and ME; CG found hepatic artery aneurysm, which was resected, with a 7-yr survival. Initial trauma in a fourth case was cholecystectomy, common duct revision, and transduodenal papillotomy; CG revealed a pulsating hepatic artery hematoma after positive HM, ME, IC, fever, and pain. Therapy was aneurysm resection; survival has been 6 yr. Clinical diagnosis of intrahepatic vascular erosion in a patient with ME followed a cicatrix-induced hepatic duct constriction; an 8-yr survival followed conservative treatment. CG diagnosis of intrahepatic bile duct lesions in two febrile patients with ME followed cholecystectomy, common duct revision, and intrahepatic stone removal; both patients are alive 4.5 yr after conservative management. Splenoportography and CG misdiagnosis of intrahepatic aneurysm of the right hepatic artery in a patient with HM, ME, IC, fever, pain, and a ruptured liver was followed by postoperative death from sepsis after hepatic artery ligation. Duodenoscopy and CG diagnosis of intrahepatic vascular erosion in a febrile patient with ME and pain due to chronic calcifying pancreatitis was followed by an 18-month survival after pancreaticojejunostomy and stone removal.

7574 PROBLEMS OF RETAINED CALCULI IN THE BILE DUCT. (Eng.) Sato, T.; Matsushiro, T.; Suzuki, N.; Nakamura, N.; Inoue, S. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 115(4):367-376; 1975.

A review of 68 cases of second operations for residual or recurrent gallstones is presented. Among these 68 cases, the stones were recurrent in only 4, residual in 38, and uncertain in 26 (apparently residual in most of these). In many of the residual stone cases, previous surgery consisted of cholecystectomy alone, suggesting an insufficient search for residual stones and other abnormalities in the biliary tract during the initial operation. Among the four recurrent stone cases, bile duct stricture, papillary stenosis, and idiopathic choledochus dilatation, occurred in one each; the remaining case, although free of any sign of bile stasis, had a gallstone formed around a silk-thread core. Indications for additional sphincteroplasty and biliodigestive anastomosis in second operations were strictly consistent with those in the first operations. There were seven operative mortalities after the second operation, and most of these were associated with persistent gallstones of long duration and serious hepatic failure. Follow-up studies in 53 patients, ranging in age from 2 months to 8 yr 10 months, revealed that 51 were in good health without any particular complaints. These results suggest that retained gallstone cases should be referred for surgical treatment as soon as possible.

7575 TREATMENT OF CHOLECYSTITIS: CHOLECYSTOSTOMY OR CHOLECYSTECTOMY? (Eng.) Vuori, E. E. (Loimaa District Hosp., Loimaa, Finland 32200). *Am. J. Surg.* 132(1):75-80; 1976.

A review of 992 consecutive patients treated by cholecystectomy for cholelithiasis and cholecystitis is presented. These patients were divided into four groups according to the gross pathoanatomic condition at the time of surgery: 454 cases of simple cholelithiasis (group I); 230 cases of acute inflammation (group II), including 98 cases that had reached the necrotic stage (group IIb); and 308 cases of chronic inflammation (group III). The mean ages of these groups were 46 yr, 3 months; 55 yr; 55 yr, 9 months; and 51 yr, 4 months; resp. The incidence of operative technical complications was 1.1, 4.3, 6.1, and 4.5%, resp. Corresponding postoperative complications occurred at incidences of 2.0, 5.2, 8.2, and 3.2%, resp. The percentages of deaths in these groups were 0.2, 0.9, 1.0, and 0.6%, resp. Operative technical complications included ruptured cystic ducts, perforated choledochal ducts, perforated cystic ducts, and ruptured minor hepatic ducts. Nonfatal postoperative complications included: pulmonary embolus, pneumonia, pleuritis of the serosa, purulent peritonitis, partial wound rupture with purulent peritonitis and paralytic ileus, wound infection, acute pyelonephritis, diarrhea, and thrombophlebitis cruris. Fatal postoperative complications included pulmonary embolus, myocardial infarction, pneumonia and myocardial infarction, and ruptured cerebral aneurysm. The low incidences of intraoperative technical difficulties and postoperative nonfatal complications, as well as the unusually low mortality (0.5% in the entire series and 0.7% among those with cholecystitis), suggest that cholecystectomy is the preferred therapy for cholecystitis at all stages of the disease, when all coexisting diseases and water and electrolyte imbalances have been treated.

7576 NONSURGICAL TREATMENT OF POSTOPERATIVELY RETAINED STONES IN THE EXTRAHEPATIC BILE DUCTS.

(Ger.) Szalatnay, Z.; Moehr, P.; Akovbiantz, A. (Chirurgische Klinik des Stadtspitals Waid, Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 106(26):876-880; 1976.

The use of sodium cholate (SC) dissolution of postoperatively retained stones is described. A 71-yr-old man was cholecystectomized after persistent epigastric pain. Peroperative cholangiography showed a suspicious shadow at the level of the hepatic duct bifurcation. During common bile duct revision, a large stone from the bifurcation area and several smaller stones from the papillary region were removed. The suspicious finding at the left bifurcation remained, but was considered an artifact; sphincterotomy was not performed. Postoperative recovery was uneventful, but T-drain cholangiography continued to show contrast media deficit at the bifurcation. A 22-day SC perfusion was undertaken via T-drain and followed cholangiographically every 3-5 days. The patient experienced slight diarrhea, managed by cholestyramine (18 g/day, p.o.), but no other complication appeared after radiological disappearance of the stone. The indications for perfusion include a stone composition of at least 70% cholesterol (the patient's was 100%), a basically unhindered bile duct flow, and sufficient T-drainage density relative to the free abdominal cavity. Central venous pressure should not exceed 30 cm (water column). The infusion solution includes 60 ml of 100 mM of SC in physiological salt solution perfused via T-drain for 2 hr daily for 3-14 days or longer. Relevant literature is reviewed, and the technique is recommended as a preferred alternative to reintervention.

7577 NONOPERATIVE EXTRACTION OF STONES FROM THE BILE DUCTS.

(Eng.) Burhenne, H. J. (Children's Hosp., P.O. Box 3805, San Francisco, CA 94119). *Semin. Roentgenol.* 11(3):213-217; 1976.

A procedure for the nonoperative extraction of retained biliary tract stones observed after cholecystectomy is described. About 5 weeks after cholecystectomy, another T-tube cholangiogram is obtained to assure that the retained stones have not shifted position or passed into the duodenum. After the T-tube has been removed, a steerable catheter is introduced through the sinus tract, and the catheter tip is manipulated into the common duct. The steerable catheter is positioned with its tip just beyond the location of the retained stone. A stone basket is introduced through the catheter, positioned distal to the stone, and then opened. The open basket is withdrawn in an attempt to snare the retained stone. Several passes may be required to accomplish this. A turning twist of the wire stem of the basket may be required to engage the stone. The basket is only retracted, never advanced, outside the enclosure of the steerable catheter. The stone is extracted through the drain tract. In order to facilitate the nonoperative extraction of retained stones, it is recommended that surgeons use no less than a number 14 French T-tube routinely after choledochotomy. Among 217 patients undergoing this procedure, 95% had successful extraction. No fatalities occurred.

7578 INSTRUCTIONS FOR THE DISSOLUTION OF CHOLESTEROL GALLSTONES WITH CHENODEOXYCHOLIC ACID. RECOMMENDATIONS OF THE PARTICIPANTS IN THE WORKSHOP "MEDICINAL DISSOLUTION OF GALLSTONES," HELD IN VIENNA, SEPT. 25, 1975.

(Ger.) Leuschner, U. (Zentrum der Inneren Medizin der Universitat, 6000 Frankfurt/Main, Theodor-Stern-Kai 7, W. Germany). *Dtsch. Med. Wochenschr.* 101(30):1132-1133; 1976.

Indications, contraindications, and therapeutic guidelines for chenodeoxycholic acid dissolution (CAD) of cholesterol stones are summarized. The principal indication is a gallbladder with functional integrity. Patients with nonopaque ductal stones can be treated if CAD is the only therapeutic alternative. Some contraindications are calcified stones, bilirubin deposits, stone diameters over 2 cm, acute cholecystitis, cholestasis, hepatitis, liver cirrhosis, alcoholic fatty liver hepatitis, acute gastritis, florid gastrointestinal ulcers, chronic bowel inflammation, malabsorption syndrome, bile acid diarrhea, cholestyramine therapy, pregnancy, and renal failure or retention. The mean daily dose should total 15 mg/kg for at least 2 yr. Monitoring, both prior to therapy initiation and during the course, should include SGOT or SGPT, alkaline phosphatase, bilirubin, gamma-glutamyl transpeptidase, cholesterol, oral cholecystography, liver biopsy, and (optional) determination of the lithogenic index, every 6-8 weeks, and 3 and 6 months. Management of complications include dose reduction to 250 mg/day for diarrhea and persistent transaminase or alkaline phosphatase elevation to or above twice the normal limit and cholecystectomy for increasing incidence of gallbladder pain.

7579 ACUTE CHOLECYSTITIS AS A POSTOPERATIVE COMPLICATION. (Eng.) Ottinger, L. W. (275 Charles St., Boston, MA 02114). *Ann. Surg.* 184(2):162-165; 1976.

The clinical course and management of 40 patients who underwent surgery for acute cholecystitis, which developed as a complication of nonbiliary surgery, are reviewed. Twenty-nine patients developed cholecystitis following their first operation, 11 had had two operations. In 22 patients, an unexplained fever was the first sign of cholecystitis. Only 11 presented with typical symptoms: pain and upper gastrointestinal complaints. Fifteen patients had cholecystitis alone, but 25 had an additional complication of gangrene, perforation, empyema, or cholangitis. In 14 patients, there were no stones in either the gallbladder or the common duct. In the 26 patients with cholelithiasis, 18 had a complication of cholecystitis. Common duct stones were present in six patients. Overall mortality was 47%. In 27%, the death could be directly attributed to the biliary complication. Of the 13 patients with perforation, empyema, or cholangitis, only 2 recovered. The cause of death in almost every case was sepsis. Bile stasis leading to concentration and inspissation of the gallbladder contents and obstruction to outflow, either from stones or the inspissated gallbladder contents, have been proposed as causes. It is concluded that the diagnosis of acute cholecystitis depends almost exclusively on the findings on physical examination and that immediate surgery is the best course for the postoperative patient.

7580 ACUTE CHOLECYSTITIS. (Eng.) Glenn, F. (No affiliation given). *Surg. Gynecol. Obstet.* 143(1):56-60; 1976.

A review of 2,021 patients treated surgically for acute cholecystitis over a 42-yr period is presented. Cholecystectomy, without prolonged delay after the demonstration of calculous disease of the biliary tract, was the treatment of choice, and the overall mortality rate for this group of patients was 3.4%. A total of 1,445 patients underwent cholecystectomy alone, while in 283 patients, common duct exploration was combined with cholecystectomy. Cholecystostomy alone was done in 283 patients as a lesser procedure than cholecystectomy, and in 10 additional patients, common duct exploration was done as well. The high mortality of the 503 patients who were 65 yr of age or older (9.3%), in contrast to a mortality rate of 1.4% for 1,518 patients under the age of 65 yr, reflects the limited capacity of the elderly to withstand surgical procedures. It is also indicative of the significance of long-standing disease of the biliary tract.

7581 THE EFFECT OF LOSS OF GALLBLADDER FUNCTION ON BILIARY LIPID COMPOSITION IN SUBJECTS WITH CHOLESTEROL GALLSTONES. (Eng.) Redinger, R. N. (Univ. Hosp., Univ. Western Ontario, London, Ontario, Canada). *Gastroenterology* 71(3):470-474; 1976.

The changes in biliary lipid composition were followed in five subjects with asymptomatic cholesterol cholelithiasis until they developed nonfunctioning gallbladders. No significant changes were noted in the relative proportion of phospholipid. There was a significant increase in the mean level of bile salt (BS, 65.5 versus 76.3 mol%, $p<0.05$) and a decrease in cholesterol (9.73 versus 5.58 mol%, $p<0.05$). The sediment crystal load also decreased after development of gallbladder nonfunction, whereas no crystals were seen in three other patients following cholecystectomy. This suggests that gallbladder contractibility had decreased in the patients with nonfunctioning gallbladders and/or that fewer cholesterol crystals were being formed in their bile. In the three postcholecystectomy subjects' bile, the increase in the relative proportion of BS did not reach statistical significance compared to bile composition from subjects with functioning gallbladders and gallstones (72.1 versus 65 mol%, $p<0.1$, >0.05), but that of cholesterol did (8.68 versus 4.23 mol%, $p<0.05$). A significant increase in secondary bile acids was found in subjects with nonfunctioning gallbladders, which persisted after cholecystectomy (16.2 versus 29.0 mol%, $p<0.05$). In the three patients with cholecystectomy, all stones were of the cholesterol type. The results support the hypothesis that gallbladder function plays an active role in determining biliary lipid composition.

7582 CHOLEDOCHAL CYSTS: ROENTGENOGRAPHIC TECHNIQUES. (Eng.) Rosenfield, N.; Griscom, N. T. (Dept. Radiology, Beth Israel Hosp., Boston, MA 02215). *Radiology* 114(1):113-120; 1975.

A series of 24 cases of choledochal cysts seen over the last 25 yr is presented. Nine patients were less than 1 yr of age and the oldest was 14 yr; five were boys. The classification triad of jaundice, pain, and mass was present in only one patient, although all had at least one of these symtpoms. Only seven cases were definitively diagnosed preoperatively: three by ^{131}I-rose bengal scanning, two by i.v. cholangiography, and one each by oral cholecystography and ^{99m}Tc-sulfur colloid scanning followed by angiography. In general, the upper gastrointestinal series examination yielded the greatest percentage of positive examinations (84%); the highest incidence of definitive positive examinations (3/4) was found with the ^{131}I-rose bengal scan. All 24 cysts were the type 1 of Alonso-lej (cystic dilatation of the common duct). Associated congenital anomalies were rare, and stones, cirrhosis, and pancreatitis were occasionally encountered. The treatment consists of surgical drainage: 15 had cystic drainage into the duodenum, 6 underwent anastomosis to the jejunum, and 3 had subtotal cyst excision before a Roux-en-Y loop was created. Twenty-one surviving patients were followed for 1-19 yr: 18 were sympton-free, 2 had recurrent jaundice, and 1 had chronic pancreatitis. There were two postoperative deaths, both from overwhelming sepsis.

7583 CEROID-LIKE HISTIOCYTIC GRANULOMA OF GALL-BLADDER—A PREVIOUSLY UNDESCRIBED LESION. (Eng.) Takahashi, K.; Oka, K.; Hakozaki, H.; Kojima, M. (Fukushima Medical Coll., Fukushima, Japan). *Acta Pathol. Jpn.* 26(1):25-46; 1976.

A peculiar gallbladder granuloma, characterized by marked proliferation of ceroid-filled brown histiocytes, was pathomorphologically, histochemically, and ultrastructurally examined in 13 cases to define the pathologic features of this previously undescribed lesion. The lesion grossly showed a granulomatous appearance of yellow-brown to dark brown color, and developed in the wall of the gallbladder. They developed from the submucosal layer to the mucosal layer, cholesterol crystal clefts, and empty vacuoles. Histologically, there was a proliferation of histiocytes containing abundant brown pigment granules in their cytoplasm. The pigment granules demonstrated staining characteristics closely resembling those of lipogenic ceroid-like pigment. The granules found in the proliferating histocytes showed prominent sudanophilia in paraffin sections and positive reaction of the mercuric diphenylcarbazone method. Ultrastructurally, these granules showed amorphus osmiophilic inclusions of heterogenous material, lamellar myelin-like structures, and some extended to and connected with the mucous membrane. Most lesions developed in isolation, although one case had two lesions. Lipid components of the bile juice, particularly unsaturated fatty acids and phospholipids, are suggested to play a major role in the development of ceroid-like histiocytic granuloma of the gallbladder.

7584 LESIONS OF THE SEGMENTAL AND LOBAR HEPATIC DUCTS. (Eng.) Longmire, W. P., Jr.; Tompkins, R. K. (Dept. Surgery, UCLA Sch. Medicine, Los Angeles, CA 90024). *Ann. Surg.* 182(4):478-495; 1975.

The hepatic and systemic effects of segmental or hepatic bile duct injury, with or without infection, congenital hepatic duct lesions, intrahepatic stones, and hepatic duct carcinoma and their effective management are discussed. These lesions produce, singly or in combination, obstruction to bile flow, precipitation of particulate matter and formation of stones, development of infection, or external biliary fistula. Unless an unobstructed uninfected biliary flow can be achieved through a segmental or lobar duct, it is better that the duct be completely obstructed and the affected liver parenchyma allowed to atrophy, provided there is normal biliary flow from the residual 50% of liver. This concept is important in the management of injured segmental or lobar hepatic ducts and in the palliative treatment of bile duct carcinoma. Localized intrahepatic infections communicating with abnormal biliary ducts require hepatic resection of the infected parenchyma and ducts for cure. The abnormality may be saccular dilatation of the intrahepatic ductal system, with abscess formation, or intrahepatic abscess associated with stenosis of the ductal system from trauma to the duct, to the duct and liver, or to retained intrahepatic stones. Diffusely situated intrahepatic abscesses secondary to ductal abnormalities can be treated with systemic antibiotics. local drainage of a dominant abscess, and efforts to improve biliary drainage. Case reports illustrating these concepts are included.

7585 BILIARY OBSTRUCTION IN THE NEWBORN. (Eng.) Koop, C. E. (Children's Hosp. Philadelphia, 34th St. and Civic Center Blvd., Philadelphia, PA 19104). *Surg. Clin. North Am.* 56(2):373-377; 1976.

Biliary obstructive lesions that require management in the early months of life by pediatric surgeons are identified. The first is extrahepatic discontinuity of the biliary tree, which is due to a developmental accident. The liver shows the same histologic picture as that of an acquired obstruction in the older infant or child. These lesions are correctable. In biliary hypoplasia, the ducts range from smaller than normal to microscopic in size. The hepatic histology shows variation in the severity of cirrhosis and ductal proliferation. This can be treated by Kasai's operation, or a period of observance, perhaps accompanied by steroid therapy, may be implemented. In some cases, if there is no loss of jaundice in 3-4 weeks, reexploration and the operation seem indicated. In some cases, there are no extrahepatic ducts visible to the naked eye. Some may have microscopic lumina in the biliary cords and will respond to the Kasai operation. Other patients will not have ducts, even under microscopic investigation, but they may still benefit from Kasai's operation.

7586 CHOLERETIC EFFECT OF CHOLERETIC AGENTS IN HUMANS. (Ger.) Eulenburg, F.; Durr, H. K.; Zelder, O.; Fischer, M. (No affiliation given). *Z. Gastroenterol.* 14(Suppl.):242; 1976.

7587 PRIMARY CLOSURE OF THE COMMON BILE DUCT. (Eng.) Wilken, B. J. (Central Hosp., Honiara, British Solomon Islands). *J. R. Coll. Surg. Edinb.* 20(2):115-119; 1975.

7588 MANOMETRIC STUDIES DURING ERCP AND ENDOSCOPIC PAPILLOTOMY. (Eng.) Rosch, W.; Koch, H.; Demling, L. (Dept. Internal Medicine, Univ. Erlangen-Nuremberg, Krankenhausstrasse 12, D-8520 Erlangen, Germany). *Endoscopy* 8(1):30-33; 1976.

7589 COMPLICATIONS AND MORTALITY FOLLOWING PAPILLOSPHINCTEROTOMY. (Rus.) Vinogradov, V. V.; Mikhailidis, M. Kh. (Dept. Surgery, Patrice

Lumumba Univ., Moscow, USSR). *Klin. Khir.* (2):63-65; 1976.

7590 SPHINCTEROTOMY AND POSTSURGICAL MORTALITY AFTER OPERATIONS ON THE COMMON BILE DUCT. (Eng.) Poltorak, J. L. (Bielanski Hosp., Warsaw, Poland). *Pol. Med. Sci. Hist. Bull.* 15/3(4): 461-465; 1975.

7591 EXTRAHEPATIC BILE DUCT AND PANCREATIC DUCT LESIONS DURING GASTRIC RESECTION. (Rus.) Utkin, N. I.; Protasevich, V. K.; Turchenko, A. L.; Iazvinskii, E. A.; Kashuro, V. I. (Mogilev Oblast Hosp., Mogilev, USSR). *Khirurgiia (Mosk.)* (10):128-1130; 1975.

7592 GAS CONTRAST STUDIES OF THE BILIARY TRACT FOLLOWING RECONSTRUCTIVE SURGERY. (Eng.) Williams, J. E.; Wilding, R. P.; Kay, D. N. (St. George's Hosp., London, England). *Clin. Radiol.* 27(2):249-254; 1976.

7593 AEROBIC BACTERIAL FLORA IN THE BILE. (Ita.) Sianesi, M.; Berri, T. (Istituto di Patologia Chirurgica, Universita di Parma, 43100 Parma, Italy). *Ateneo Parmense* [*Acta Biomed.*] 46(6): 521-533; 1975.

7594 CLOSTRIDIUM SEPTICEMIA FOLLOWING BILIARY SURGERY IN A GASTRECTOMIZED PATIENT. (Eng.) Aukee, S.; Alhava, E. M.; Koskela, E., Lahtinen, J.; Salmela, J. (Univ. Central Hosp. of Kuopio, 70210 Kuopio 21, Finland). *Scand. J. Gastroenterol.* 10(1):109-111; 1975.

7595 AN ATTEMPT TO DETERMINE SURGICAL INDICATION FOR BILIARY ATRESIA BY LABORATORY EXAMINATION. (Eng.) Chiba, T.; Kasai, M. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 115:345-353; 1975.

7596 CURRENT PROBLEMS OF CHRONIC BILIARY TRACT INFLAMMATION IN CHILDREN. (Rus.) Spasskaia, Z. A. (Gorki Medical Inst., Gorki, USSR). *Pediatriia* (3):81-84; 1976.

7597 EFFECT OF BETA-SITOSTEROL ON CHOLESTEROL-CHOLIC ACID-INDUCED GALLSTONE FORMATION IN MICE. (Eng.) Goswami, S. K.; Frey, C. F. (Wayne County General Hosp., Ann Arbor, MI). *Am. J. Gastroenterol.* 65(4):305-310; 1976.

7598 CHOLELITHIASIS AND CHOLECYSTITIS IN CHILDREN. (Eng.) Zwart, W. A. J.; Megens, J. G. N. (St. Hippolytus Hosp., Delft, Netherlands). *Arch. Chir. Neerl.* 27(3):187-192; 1975.

7599 CHOLECYSTITIS. A CLINICAL SERIES. (Eng.) Solheim, K.; Dale, G.; Walloe, A. (Ulleval Hosp., Oslo, Norway). *J. Oslo City Hosp.* 25(8): 125-133; 1975.

7600 PENTOXYL IN THE COMPLEX TREATMENT OF CHILDREN WITH CHRONIC CHOLANGIOCHOLECYSTITIS. (Rus.) Denisova, M. F. (Kiev P. M. Buiko Scientific Res. Inst. Pediatrics, Obstetrics and Gynecology, Kiev, USSR). *Pediatriia* (3):62-63; 1976.

7601 NONANASTOMOTIC HEPATICOGASTROSTOMY FOR PALLIATIVE DECOMPRESSION. (Eng.) Moss, C. M.; Schein, C. J. (Montefiore Hosp., 111 E. 210th St., Bronx, NY 10467). *Surg. Gynecol. Obstet.* 142 (4):587-588; 1976.

7602 CONGENITAL DILATATION OF THE COMMON BILE DUCT AND BOCHDALEK HERNIA. (Eng.) Alvear, D. T.; Rayfield, M. M. (Polyclinic Hosp., Harrisburg, PA). *J. Pediatr. Surg.* 11(2):243-245; 1976.

7603 UPPER GASTROINTESTINAL BLEEDING ASSOCIATED WITH BILIARY DIVERSION. (Eng.) Simonowitz, D.; Paloyan, D. (Dept. Surgery, Univ. Chicago, 950 E. 59th St., Chicago, IL 60637). *Am. Surg.* 42(4):233-235; 1976.

7604 HEMOBILIA: A CASE WITH RECURRENT JAUNDICE CURED BY REMOVAL OF A BLOOD CLOT FROM THE COMMON BILE DUCT. (Eng.) van der Linden, W. (Dept. Surgery, Centrallasarettet, Ostersund, Sweden). *Acta Chir. Scand.* 141(5):445-447; 1975.

7605 THE MORISON POUCHE. (Eng.) Gilliam, J. W., Jr.; Schein, C. J. (Montefiore Hosp., 111 E. 210 St., Bronx, NY 10467). *Arch. Surg.* 111(3):227-228; 1976.

7606 BILIARY PERITONITIS DUE TO IDIOPATHIC PERFORATION OF THE COMMON BILE DUCT. (Eng.) Dinner, M. (Dept. Surgery, Univ. Witwatersrand, South Africa). *S. Afr. J. Surg.* 13(4):207-209; 1975.

7607 INTRAHEPATIC RUPTURE SECONDARY TO DUCT EXPLORATION DEMONSTRATED BY CHOLANGIOGRAPHY. (Eng.) Goldman, S. M.; Diamond, A.; Salik, J. O. (Sinai Hosp., Belvedere at Greenspring Ave., Baltimore, MD 21215). *Radiology* 118(1):13-17; 1976.

See also, 7091, 7112, 7113, 7118, 7132, 7134, 7135, 7137, 7140, 7147, 7290, 7427, 7431, 7466, 7473, 7661, 7669.

7608 POLYVINYL ALCOHOL (IVALON)--A NEW EMBOLIC MATERIAL.

(Eng.) Tadavarthy, S. M.; Moller, J. H.; Amplatz, K. (Univ. Minnesota Hosps., Minneapolis, MN 55455). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(3):609-616; 1975.

Experience with the use of polyvinyl alcohol, both in dogs and in two patients, is reported, together with a description of the previous uses of this substance and of the preparation of polyvinyl alcohol emboli. The polyvinyl alcohol plastic foam is soaked in heparin and compressed in a vice and dried. One-half- to one-millimeter diameter plugs are cut from the material and preloaded in small plastic tubing. The plugs and tubing are then gas sterilized. At the time of embolization. the preloaded tubes are connected to a catheter, and the plugs are flushed into the catheter and blood vessel by forceful manual saline injection. Seventy-two hours following the embolization of the renal arteries in dogs, angiography revealed obstruction of the artery with no evidence of recanalization. One week after the procedure, the renal artery was occluded at its most proximal portion due to antegrade thrombosis. Histologic examination of the renal cortex revealed thrombosis of several renal arteries, noncanalization, and several areas of hemorrhagic necrosis due to thrombosis of the intrarenal arteries. The problem of lysis and fragmentation does not exist. In one case, the contralateral kidney showed several areas of infarction, and this was thought to be due to too rapid injection of the emboli. Transcatheter embolization of the hepatic artery was carried out in a 4.5-yr-old boy with a hemangioendothelioma to decrease the size of the liver in preparation for a liver transplant. Because the artery was huge, injection of small emboli could not be used. A stainless steel umbrella and small nylon bristle brushes were advanced with a guidewire through the catheter, serving as a baffle for the injected embolic material. After the procedure, there was practically no blood flow through the embolized hepatic artery, and complete occlusion at its origin, with demonstration of collateral flow to the liver via branches arising directly from the aorta and inferior phrenic arteries, was seen 2 months later. The patient died of metastatic hemangiosarcoma; autopsy revealed no distal embolization due to the baffle and antegrade thrombosis of the main hepatic artery. A second patient had congestive heart failure complicating a large hemangioendothelioma on the neck and forehead. The heart failure was thought to be due to high output failure, and embolization was used to decrease the vascular supply to the mass. Feeders from the left and right thyrocervical trunk, from the right and left subclavian artery, and from the left occipital artery were embolized, and temporary clinical relief was seen. Polyvinyl alcohol has proved to be a good synthetic embolic material.

7609 INFLUENCE OF THE POSTOPERATIVE STATE ON THE INTRACELLULAR FREE AMINO ACIDS IN HUMAN MUSCLE TISSUE.

(Eng.) Vinnars, E.; Bergstom, J.; Furst, P. (Dept. Anesthesiology, Sit Eriks sjukhus, S-112 82 Stockholm, Sweden). *Ann. Surg.* 182(6): 665-671; 1975.

The free amino acid concentrations in muscle tissue were determined in five patients before and 2-3 days after major, uncomplicated abdominal surgery. Muscle tissue was obtained by needle biopsy from the lateral portion of the quadriceps femoris, and plasma free amino acids were measured. Most of the amino acids showed much higher concentration in intracellular water than in plasma. Preoperatively, all amino acids examined were formed within normal limits. Postoperatively, the total amount of free amino acids in plasma and muscle was decreased, and the amino acid profiles differed from those of normal subjects. In post-traumatic plasma, the most significant changes were an increase in phenylalanine and tyrosine and a decrease in isoleucine and histidine ($p<0.001$). In muscle, the greatest decrease occurred in the concentrations of glutamine, arginine, and lysine, followed by proline and glutamic acid. The increases in taurine, valine, and phenylalanine were all highly significant, and those in serine, glycine, alanine, and leucine were significant. There were marked increases (compared with normal values) in the gradient between the intracellular and plasma concentrations that were highly significant for glycine and valine and significant for serine, alanine, isoleucine, and leucine. The phenylalanine/tyrosine ratio was increased in both plasma and muscle, but was significant only for muscle. These studies confirm that the alterations in muscle-free amino acids are not reflected in the plasma amino acid concentrations.

7610 ANTIBIOTIC RESISTANCE AND SURVIVAL OF E Coli IN THE ALIMENTARY TRACT.

(Eng.) Hartley, C. L.; Richmond, M. H. (Dept. Bacteriology, Univ. Bristol., Bristol BS8 1TD, England). *Br. Med. J.* 4(5988):71-74; 1975.

The survival of various resistant and sensitive *Escherichia coli* O types in the alimentary tract of persons not known to be receiving antibiotics as studied to determine why some resistant strains persist in persons not undergoing antibiotic treatment. Factors that are important for the survival of resistant strains during the transition from an antibiotic-rich to an antibiotic-poor (or antibiotic-free) environment in man were also studied. Fecal samples were taken on a routine basis at intervals of a few days from volunteers, and plated bacterial colonies were tested with discs for their resistance to ampicillin (25 μg/disc), tetracycline (50 μg), streptomycin (25 μg), and chloramphenicol (50 μg). The colonies were also O-typed. When isolates were resistant to antibiotics, the transfer of their resistance determinants to an R-negative *E. coli* recipient was tested by a standard mating procedure. The incidence of both resistant and sensitive *E. coli* O types in the predominant part of the coliform flora was followed in 33 persons for a total of 2,578 days. Ninety-five different sensitive and 65 different resistant O-types were found. The mean residence time of all sensitive O types was 5.7 days, while that for resistant strains was 6.1 days. When this second average was recalculated for those coliforms carrying R factors alone (as shown either by resistance transfer in the standard test or by the presence of a tetracycline resistance determinant in the strain), the mean residence time for R-positive O types was 6.6 days. R-factor carriage does not seem to have a major effect on the survival of *E. coli* strains, as identified by O-typing in persons not receiving antibiotics. Survival of resistant bacteria in the absence of antibiotic selection pressure appears to depend on the characteristics of the *E. coli* host rather than on those of the plasmid that is carried.

7611 INTESTINAL BEHCET'S DISEASE: REPORT OF FIVE CASES. (Eng.) Baba, S.; Maruta, M.; Ando, K.; Teramoto, T.; Endo, I. (Keio Univ. Sch. Medicine, 35 Shinanomachi, Shinjuku-ku, Tokyo, Japan). *Dis. Colon Rectum* 19(5):428-440; 1976.

The cases of five patients (age range, 13-28 yr) with Bechet's disease, two of which had intestinal ulcers observed by colonfiberscopy, are presented, together with a review of 49 surgically treated cases and 14 cases that occurred with colitis. The symptoms included stomatitis aphthosa, abdominal pain, genital ulceration, uveitis (2 cases), and diarrhea (1 case). In the first patient, a barium enema examination revealed multiple ulcers in the ileocecal region and the ascending, transverse, and sigmoid colon. A repeat barium enema study revealed no ulceration after the administration of a total of 720 mg of paramethasone. Colonofiberoscopy revealed ulceration in the cecum and ileocecal region, and a right hemicolectomy was carried out. Perforated ulcers were found in the ileum and cecum. One year later, another ileal resection was carried out for reperforation of the ileum, and the patient is now doing well. In the second patient, a barium examination revealed ulceration at Bauhin's valve, and colonofiberscopy revealed another ulcer in the terminal ileum. Hemicolectomy, including 50 cm of ileum, was carried out. One year after the operation, recurrent genital ulceration produced a rectovaginal fistula, which necessitated a sigmoidal colostomy. In the third patient, multiple perforations in the cecum and ascending colon, resulting in panperitonitis, were found 4 days after an emergency appendectomy had been performed. Exteriorization, followed 1 yr later by hemicolectomy, was performed, and the patient has been asymptomatic for 7 yr. In the fourth patient, three tumor masses were found in the ileocecal region and ileum. All tumors were covered by omentum. A hemicolectomy was performed, and examination of the resected specimen showed three deep and seven shallow ulcers. The fifth patient underwent resection of the cecum and part of the ileum for sealed perforation of the cecum. The resected specimen showed multiple ulcers with fistulae and many sealed perforations. Microangiograms of the resected specimen of patient 1 revealed that both a penetrated ulcer in the cecum and a partially re-epithelized ulcer in the ileum were avascular, especially at their bases. The authors propose that the impairment of the microcirculation at the site of the vascular network in the submucosal layer might contribute to the development of ulcers.

7612 CONGENITAL CHLORIDE DIARRHOEA WITH FUNCTIONAL ILEUS IN A PREMATURE INFANT. (Eng.) Buts, J. P.; Goenen, M.; Claus, D.; Otte, J. B.; De Meyer, R.; Tremouroux, J. (Cliniques universitaires, St. Joseph, 3020 Herent, Louvain, Belgium). *Helv. Paediatr. Acta* 30(4/5):343-348; 1975.

A case of congenital chloride diarrhea with functional ileus, which was diagnosed in a premature (born at 31 weeks of gestation) male infant of North African parentage on the 5th day of life, is reported. On first physical examination, the patient presented marked abdominal distension with a poor peristalsis. Laboratory results obtained on the 4th and 5th day of life showed very high chloride levels (166 and 199 mEq/l) in the stools, and a diagnosis of congenital chloride diarrhea was made, based on the fact that fecal chloride exceeded the sum of sodium (118 and 141 mEq/l) and potassium (6 and 48 mEq/l) excretion on days 4 and 5, resp. Despite total i.v. feeding (Aminofusin forte, 20 ml/24 hr; Intralipid 20%, 20 ml/24 hr), large amounts of fluids (200 ml/kg/24 hr), and adequate supplies of electrolytes, the stools remained unchanged; severe metabolic acidosis became unresponsive to bicarbonate and tromethamine therapy. On the 6th day, cutaneomucous pallor, dehydration, polyuria (590 ml/24 hr), impaired neurological condition, and respiratory distress suddenly occurred. Thereafter, the patient's condition quickly deteriorated, and he died on the 8th day after birth. Anemia, flaccidity, unresponsiveness, polyuria, and dehydration, which simultaneously occurred on the 6th day of life, were attributed to cerebral hemorrhage. Although this potentially fatal complication is frequent in unaffected preterm infants, it is suggested that the hemoconcentration due to severe osmotic diarrhea and hyperosmolality resulting from bicarbonate therapy, electrolyte infusions, and parenteral feeding might have had a synergic effect on its development.

7613 ZINC DEFICIENCY IN TWO INFANTS DURING TOTAL PARENTERAL ALIMENTATION FOR DIARRHEA. (Eng.) Arakawa, T.; Tamura, T.; Igarashi, Y.; Suzuki, H.; Sandstead, H. H. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Am. J. Clin. Nutr.* 29(2):197-204; 1976.

The occurrence of zinc deficiency in two male infants receiving total parenteral alimentation (TPA) for chronic diarrhea of 3-4-month's duration is reported. The first patient was admitted at 7 months of age, and he received TPA for 10 months, without improvement in the frequency and character of his diarrhea. The other patient was admitted at 3 months of age, and after 6 months of TPA, his diarrhea completely ceased. An acrodermatitis enteropathica-like rash occurred in both infants on the 22nd and 25th day of TPA treatment, resp. The rash consisted of erythema; vesicles; denuded patches; pustules around natural orifices, the genitalia, perineum, fingers, and toes; alopecia; blepharitis; and paronychia. Treatment with zinc sulfate (35 mg/day, p.o.) resulted in the cure of the rash within a few days, as well as in the subsidence of other signs consistent with zinc deficiency (low plasma zinc concentrations and a decline in serum alkaline phosphatase). *Staphylococcus aureus* was cultured from the rash of both infants. A breakdown in repair mechanisms in the skin coupled with an impaired local resistance to *S. aureus* is believed to have caused the rash.

7614 THE ROLE OF ALTERED INTESTINAL PERMEABILITY IN THE PATHOGENESIS OF Salmonella DIARRHEA IN THE RHESUS MONKEY.

(Eng.) Kinsey, M. D.; Dammin, G. J.; Formal, S. B.; Giannella, R. A. (Walter Reed Army Inst. Res., Washington, DC). *Gastroenterology* 71(3):429-434; 1976.

To test the hypothesis that altered intestinal permeability may play a role in *Salmonella* diarrhea, sodium and water transport, erythritol and mannitol clearance into perfused intestinal loops, and changes in transmural electrical potential difference in response to hypertonic intestinal perfusion were studied in male rhesus monkeys infected with *S. typhimurium* (5×10^{10} organisms, p.o.). In the *Salmonella*-infected animals, the morphological changes in the ileum and colon were more striking than those in the jejunum. In the ileum, there was a fulminating, acute, diffuse, inflammatory reaction involving the mucosa and submucosa. In the colon, there was acute diffuse colitis, characterized by inflammatory cell infiltration of the mucosa and submucosa, crypt abscesses, and bacterial invasion of the epithelial cells and lamina propria. In normal controls, water absorption occurred in the jejunum, ileum, and colon, at mean rates of -124.2, -132.9, and -81.1 μl/hr/cm, resp. In the *Salmonella*-infected animals, there was a striking reversal in net water movement in all intestinal sites; water secretion occurred at mean rates of 18.8, 75.5, and 38.9 μl/hr/cm in the jejunum, ileum, and colon, resp. In normal animals, low mean steady state transmural electrical potential differences were obtained in the jejunum and ileum (-1.7 and +1.0 mv, resp.), whereas a high value was found in the colon (-18.0 mv). In the infected animals, the mean potential difference was significantly higher in the ileum and colon (-3.4 and -31.9 mv, resp.). In normal animals administered with hypertonic ^{14}C-erythritol, there was a gradient of diminishing permeability from jejunum, to ileum, to colon, the mean permeability coefficients being 0.193, 0.100, and 0.016 cm^2/hr, resp. When hypertonic ^{3}H-mannitol was injected, the corresponding coefficients were 0.041, 0.026, and 0.025 cm^2/hr. In the *Salmonella*-infected animals, there was no significant increase in permeability over control values in jejunum, ileum, or colon for either erythritol or mannitol; there was significantly diminished erythritol permeability in the jejunum (0.147 cm^2/hr). As a positive control in normal animals, perfusion with 25 mM EDTA increased permeability, resulting in increased plasma-to-lumen isotope flux and no streaming potential in response to hypertonic perfusates. The data show that despite severe alterations in intestinal histology, transmucosal permeability remains unchanged and is not a contributing factor in *Salmonella* diarrhea.

7615 NEONATAL NECROTISING ENTEROCOLITIS.

(Eng.) Davies, M. R. Q. (Red Cross War Memorial Children's Hosp., Cape Town, South Africa). *S. Afr. J. Surg.* 13(2):97-101; 1975.

A review of nine cases of presumed neonatal necrotizing enterocolitis is presented. The patients' ages ranged from 24 hr to 27 days and eight of the neonates weighed less than 2.5 kg on admission. Indications for referral and subsequent surgical intervention were: pneumoperitoneum in six cases, severe localized peritonitis in two cases, and diffuse peritonitis in one case. Abdominal x-ray studies showed ileus in seven cases. Although a pneumoperitoneum was seen in six patients, intestinal pneumatosis was present in only one case. Only three patients survived surgery. In two, early localization of the bowel perforations was present with abscess formation. Simple surgical drainage proved successful in one of these patients, while a surgical drainage procedure was covered by a proximal defunctioning colostomy in the other. Significant ileal gangrene with generalized peritonitis was found in the only other survivor; resection and the construction of a Bishop Koop ileostomy gave satisfactory results. Six patients died of uncontrollable gram negative sepsis. Terminal respiratory failure with an associated consumptive coagulopathy was a common finding. The high mortality rate in this group of patients was attributed to the excessive delay in the diagnosis of the presence of significant intra-abdominal pathology.

7616 BUOYANT DENSITY IN CESIUM CHLORIDE OF THE HUMAN REOVIRUSLIKE AGENT OF INFANTILE GASTROENTERITIS BY ULTRACENTRIFUGATION, ELECTRON MICROSCOPY, AND COMPLEMENT FIXATION.

(Eng.) Kapikian, A. Z.; Kalica, A. R.; Shih, J. W.-K.; Cline, W. L.; Thornhill, T. S.; Wyatt, R. G.; Chanock, R. M.; Kim, H. W.; Gerin, J. L. (Lab. Infectious Disease, Natl. Inst. Allergy Infectious Diseases, Bethesda, MD 20014). *Virology* 70(2): 564-569; 1976.

The buoyant density in cesium chloride of the human reovirus-like (HRVL) agent of infantile gastroenteritis was studied by electron microscopy and complement fixation (CF) to detect the reovirus-like particles in fractions of the density gradient. Virus-positive stool filtrates from three infants, aged 11, 13, and 16 months were studied. Morphologically full reovirus-like particles had a density of 1.35-1.37 g/cm^3, whereas empty particles had a density of 1.29 g/cm^3. Peak CF activity coincided with the peak fraction of both the full and empty reovirus-like particles. CF activity was also associated with the virion and not with a soluble antigen. The density of the human reovirus-like agent in cesium chloride is similar to that observed for the antigenically related Nebraska calf diarrhea virus, the reoviruses, and the bluetongue virus "L" (light) form, which probably represents the mature virion of this orbivirus. In addition, the density of the empty human reovirus-like particles is similar to that reported for the reovirus top component of empty reovirus particles.

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658 STREPTOZOTOCIN IN THE ZOLLINGER-ELLISON SYNDROME [Letter to Editor]. (Eng.) Lamers, C. B. H.; van Tongeren, J. H. M. (St. Radboud Ziekenhuis, Nijmegen, Netherlands). *Lancet* 2(7945):1150-1151; 1975.

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See also, 7119, 7121, 7158, 7174, 7175, 7208, 7212, 7280, 7332, 7355, 7362, 7377, 7378, 7388, 7394, 7405, 7674.

GENERAL

Parasitology

7660 Schistosoma mansoni IN BABOONS; III. THE COURSE AND CHARACTERISTICS OF INFECTION, WITH ADDITIONAL OBSERVATIONS ON IMMUNITY. (Eng.) Damian, R. T.; Greene, N. D.; Meyer, K. F.; Cheever, A. W.; Hubbard, W. J.; Hawes, M. E.; Clark, J. D. (Dept. Zoology, Univ. Georgia, Athens, GA 30602). *Am. J. Trop. Med. Hyg.* 25(2):299-306; 1976.

The course and characteristics of *Schistosoma mansoni* infections were studied in 54 baboons. The compatibility of the *S. mansoni-Biomphalaria pfeifferi--Papio cynocephalus* system was evidenced by the infectivity of cercariae to baboons, including a high penetration rate (97.7%) and a high adult worm recovery rate (41.7%). The baboons generally tolerated the infection well, and the worms were long-lived and fertile in these animals. Pathological findings were generally unremarkable except for the observation of a much lower tendency for hepatic granulomas to fibrose, as compared with those in the gut. An acute "toxemic" phase occurred 66 days or less after a large cercarial exposure (1,789-10,000 cercariae) in three baboons. Worm burdens were not significantly reduced during the course of prolonged infections, except in the group of five baboons who were challenged after repeated small exposures ("trickle" infections) over a 3-yr period. An anterior shift in egg deposition sites (from the colon to the small intestine) with longer infection periods was observed in those animals singly infected or repeatedly exposed to *S. mansoni*. Prolonged infection also resulted in decreased oviposition by worms. Decreased oviposition and the anterior shift may be the result of a second phase of immunity distinct from the concomitant immunity also observed in the baboon infections. As is true of man, the baboon and grivet monkey are slow to develop immunity. Thus baboons and grivet monkeys may be successfully employed as experimental models for human schistosomiasis, particularly in the study of its immunological aspects. The delayed immunity may allow one to dissociate the effects of fairly chronic infections from those of protective immunity.

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7662 THE PUBLIC HEALTH IMPLICATIONS OF LARVAL Thynnascaris NEMATODES FROM SHELLFISH. (Eng.) Norris, D. E.; Overstreet, R. M. (Dept. Biology, Univ. Southern Mississippi, Hattiesburg, MS 39401). *J. Milk Food Technol.* 39(1):47-54; 1976.

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7667 THE JEJUNUM IN GIARDIASIS [Abstract]. (Eng.) Ridley, M. J.; Ridley, D. S. (Hosp. Tropical Diseases, London, England). *Trans. R. Soc. Trop. Med. Hyg.* 70(1):10-11; 1976.

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See also, 6919, 7089, 7105, 7408, 7622, 7623, 7624, 7625, 7641, 7643, 7646, 7647, 7648, 7649.

GENERAL

Regional Enteritis

7670 SEASONAL VARIATIONS IN THE CLINICAL PRESENTATION OF CROHN'S DISEASE AND ULCERATIVE COLITIS. (Eng.) Cave, D. R.; Freedman, L. S. (St. George's Hosp. Medical Sch., Hyde Park Corner, London, S.W.1, England). *Int. J. Epidemiol.* 4(4):317-320; 1975.

The cases of 211 patients with Crohn's disease and 201 patients with ulcerative colitis were studied to determine if there is a seasonal variation in the onset of the disease. It was demonstrated that Crohn's disease has a peak onset in January and July, whereas ulcerative colitis has a possible peak of onset in December. These findings suggest that there are environmental factors, perhaps an infective agent, involved in the etiology of Crohn's disease and that these may be different from the factors involved with ulcerative colitis.

7671 ANGIOGRAPHIC SPECTRUM IN CROHN'S DISEASE OF THE SMALL INTESTINE AND COLON. (Eng.) Miller, M. H.; Lunderquist, A.; Tylen, Y. (Dept. Diagnostic Radiology, Univ. Hosp., Lund, Sweden). *Surg. Gynecol. Obstet.* 141(6):907-914; 1975.

Barium and angiographic examinations of the small intestine and colon were performed (within 1 month of each other) in 34 patients with histopathologically verified Crohn's disease. Patients were examined before (23) or after (11) resection of the intestine. Barium examination of the small intestine was abnormal in 18 preoperative patients. Two patients in the nonstenotic stage demonstrated mucosal edema but no destructive changes of the vasa. The 16 patients in the stenotic stage had a definite narrowing of the intestine and morphologic changes of the vasa, ranging from irregularity to complete occlusion of the stem. A distinctive angiographic pattern was present in the distal small intestine of patients with advanced narrowing. Barium and angiographic examination of the colon demonstrated no significant narrowing in five nonstenotic patients. All patient demonstrated a hypervascular blood supply to the colon, and in contrast to the small intestine, lumen irregularities of the vasa were limited mainly to the distal portion of the mural vasa, rather than the entire length. Four stenotic patients demonstrated advanced narrowing of the colon, but the vas crossing the colon were narrow, indicating the absence of hypervascularity. In the 11 postresection patients, the barium examination was positive for recurrent disease in all patients, but the angiogram d umented extension of disease in three patients in areas appearing normal at barium examination. At angiography, the colon was hypervascular distal to the anastomosis as a skip lesion in two patients in whom the barium enema was normal.

7672 COLLAGEN PEPTIDASE IN CROHN'S DISEASE. (Ger.) Shalev, E.; Stojan, B.; Fahrlander, H. (Departement Innere Medizin der Universitat, Kantonsspital, CH-4004 Basel, Spitalstr. 21, Switzerlan *Dtsch. Med. Wochenschr.* 101(18):685-687; 1976.

Based on the histological similarity of Crohn's disease (CD) and sarcoidosis and the role of collagen peptidase (CP) in sarcoidosis diagnosis, the role of CP in CD has been studied. The clinical sample included 71 CD patients, 40 of whom had received surgery, and 21 were under immunosuppressive management. CP was elevated in 54 patients, normal in 13, and decreased in 4 CD patients. The mean value was 36.7 clinical U/ml serum for CD patients and 24.4 clinical U/ml for the control group (24 subjects), a significant difference of $p<0.001$. The average CP level in the surgically and nonsurgically treated CD groups was 39.3 and 33.5 clinical U/ml, resp., both of which are significantly higher than control values ($p<0.001$). The average serum CP levels and their significance in the subgroups receiving immunosuppressive and not receiving immunosuppressive therapy was 29.5 clinical U/ml ($p<0.025$) and 39.7 clinical U/ml ($p<0.001$), resp. The CP level in the group not treated by immunosuppressives was very significantly ($p<0.001$) increased over the treated group and the CP level in the surgical group was also significantly ($p<0.05$) increased over the nonsurgical group. As in sarcoidosis, elevated CP is an expression of increased collagen turnover, compatible with the histological picture of increased collagenous stroma in the intestinal wall.

7673 RARE FISTULA FORMATION IN CROHN'S ENTEROCOLITIS REGIONALIS. (Ger.) Morl, M.; Fuchs, H.; Riemann, J. (Stoffwechselklinik der LVA Wurttemberg, D-6990 Bad Mergentheim, W. Germany). *Med. Klin.* 71(19):814-819; 1976.

Five case histories are reviewed to illustrate the complicating effect of abscess and fistula formation on the diagnosis of Crohn's disease (CD). A 25-yr-old woman with a 12-yr history of gastrointestinal problems uncorrected by terminal ileum resection and ileotransverscolostomy without colonic resection presented with a rectovaginal fistula, mucosal ulceration, and submucosal fibrosis typical of CD. Colonoscopy revealed sigmoid stenosis, rectosigmoid pseudopolyps, and CD recurrence 70 cm rostral to the anastomosis in the terminal ileum. Some fistula regression followed long-term corticosteroid therapy. Subtotal colectomy with partial ileal resection and ileorectostomy were performed after discovery of periproctitic fistulas and a fistula system between the greater curvature of the stomach and abscess cavities in the spleen bed. A 33-yr-old woman with a similar history of CD presented with a 10-cm long fistula between the terminal ileum and right third of the transverse colon. Progressive formation of small bowel inflammatory tumor conglomerates was associated with a right hydronephrosis. The tumor tissue and fistula system were removed and an ileotransversostomy was performed. A 31-yr-old woman with a recent history of CD was found to have several fistulas from the rectosigmoid transition to the terminal ileum, without stenosis or abscess. Surgery was not indicated. The fourth patient, a 25-yr-old woman with suspected CD developed intractable pain radiating from the lumbar region through the right limb. An abscess over the right gluteus maximus was found to empty into the rectum via a foxhole fistula system. Prognosis after ileohemicolectomy is doubtful. The final case concerns a 48-yr-old woman with a history of periproctitic fistulas presenting with CD and a large rectovaginal fistula. Conservative management with salazosulfapyridine and corticosteroids led to general improvement and some fistula regression. Exact radiological and endoscopic articulation of fistula systems is required before surgical intervention.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tra Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mm	millimeter(s)
ADP	adenosine diphosphate	mOsm	milliosmolar; milliosmeter(s)
AMP	adenosine monophosphate	msec	millisecond(s)
amp	ampere	mV	millivolt(s)
ATP	adenosine triphosphate	min	minute(s)
A	angstrom	MTD	maximum tolerated dose
BSP	sulfobromophthalein	NAD	nicotinamide adenine dinucleotide
C	degrees centigrade	NADH	reduced nicotinamide adenine dinucleotide
cal	calories		
cc	cubic centimeter	NADP	nicotinamide adenine dinucleotidephosphate
cm	centimeter(s)		
dl	deciliter	NADPH	reduced nicotinamide adenine dinucleotidephosphate
DNA	deoxyribonucleic acid		
ED$_{50}$	median effective dose(s)	ng	nanogram (10^{-9})
EDTA	ethylenediamine tetraacetic acid	nm	nanometer(s)
e.g.	for example	Pa	ambient pressure
EEG	electroencephalogram	PAS	periodic acid - Schiff
ESR	erythrocyte sedimentation rate	pg	picogram (10^{-12})
g	gram(s)	pgEq	picogram equivalent(s)
μg	microgram(s)	p.o.	orally
Hz	Hertz	ppb	parts per billion
hr	hour(s)	ppm	parts per million
i.m.	intramuscular	r	Roentgen
i.p.	intraperitoneal	RBC	red blood cells (erythrocytes), red blood count
IU	international unit(s)		
i.v.	intravenous	resp.	respectively
kcal	kilocalorie(s)	RNA	ribonucleic acid
kg	kilogram(s)	s.c.	subcutaneous
K$_m$	Michaelis constant	sec	second(s)
LD$_{50}$	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase		
m	meter(s)	SGPT	serum glutamic-pyruvic transaminase
M	molar; mole(s)		
mM	millimolar; millimole(s)	U	unit(s)
μM	micromolar; micromole(s)	UV	ultraviolet
ma	milliampere(s)	V	volt
mCi, μCi	milli-, microcurie(s)	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mg	milligram(s)	yr	year(s)
ml, μl	milli-, microliter(s)		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

7680 FURTHER HISTOPHYSIOLOGICAL OBSERVATIONS ON THE LOWER ESOPHAGUS OF THE RABBIT. (Eng.)

Cecio, A.; Califano, G.; Lobello, R. (Istituto Anatomico, Via Veterinaria 1, 80137, Naples, Italy). *Cell Tiss. Res.* 168(4):475-488; 1976.

Previous neurohistological studies were extended to include the structures contained solely or mainly within the junctional esophageal segment that may play an important role in the sphincter mechanism. Cross sections from the cervical, thoracic, and abdominal segments of the esophagus of 18 rabbits were examined. There was a progressive thickening of the muscularis mucosae from the cervical to the caudal end of the esophagus. The circular muscle layer showed a progressive thickening from the cervical to the abdominal segment. There were abundant and close interconnections between the esophageal striated fibers and gastric smooth muscle cells. Helico-spiral thin elastic fibers were found within the esophageal wall, and the number of these fibers was greatly increased at the gastroesophageal junction. In this area, they occurred mostly within the middle muscle layer. These fibers were wrapped around bundles of musculature describing coils of variable diameters. From the cervical to the abdominal esophagus, there was an increase in the intramural nerve component, particularly Auerbach's plexus; the Auerbach's plexus consisted of a continuous nervous layer containing twice as many neurocytes as the upper esophageal segments. The motor endplates were abundant in the esophagus, particularly within the circular muscle layer of the junctional segment. These endplates often possessed ultra-expansional fibers and secondary endplates. The authors conclude that the neurohormonal factors and their related structures are the most important entities in understanding the sphincterial mechanism of the esophagogastric junction.

7681 THE DISTRIBUTION OF ARGYROPHILE AND ARGENTAFFIN CELLS IN THE SMALL INTESTINE OF RABBITS. (Eng.)

Dhall, U. (Dept. Anatomy, Medical Coll., Rohtak, India). *Anat. Anz.* 138(5):385-391; 1975.

The distribution of enterochromaffin cells was studied in the small intestine of six rabbits, and this pattern was compared with that reported in other species. The patterns of distribution of the argyrophile and the argentaffin cells in each rabbit are illustrated. The highest density of both argyrophile and argentaffin cells occurred in the proximal small intestine. Proceeding caudally from the duodenum, the density of the argyrophile cells decreased sharply over the proximal one third. Thereafter, in the distal two-thirds of the small intestine, the curve of distribution leveled off in one animal and showed a very gradual fall in the other five. The density of the argentaffin cells also decreased in the proximal third of the intestine, although this drop was not as marked as that of the argyrophile cells. In most of the animals, the curves of distribution of both argyrophile and of argentaffin cells showed several waves of rising and falling. A review of the literature reveals that there are con derable species variations in the distribution of argyrophile and argentaffin cells.

7682 DEVELOPMENT OF THE SMALL INTESTINE IN T HYPOPHYSECTOMIZED RAT. II. INFLUENCE CORTISONE, THYROXINE, GROWTH HORMONE, AND PROLACT (Eng.)

Yeh, K.; Moog, F. (Dept. Biology, Washington Univ., St. Louis, MO 63130). *Dev. Biol.* 47(1 173-174; 1975.

The influence of daily doses of cortisone 50 μg/g body weight, thyroxine 1 μg/g body weight, or gro hormone (or prolactin) 20 or 500 μg on the develo ment of the small intestine in the hypophysectomi rat was investigated. The intestinal deficiencie caused by hypophysectomy of NLR rats at 6 days of were repaired to varying degrees by thyroxine or tisone but not by growth hormone or prolactin. A istration of thyroxine alone from 19-22 days rais duodenal alkaline phosphatase activity to normal levels at 24 days. It had a strong effect on jejunal sucrase and maltase, although these activit remained below those of controls. Thyroxine increased the rough endoplasmic reticulum markedly restored the Golgi complexes to their normal conf uration. It intensified the periodic acid-Schiff (PAS) stainability of the brush border. Cortison given from 19-22 days, elevated sucrase and malta activities to normal levels but did not fully restore phosphatase activity. It intensified stai of the brush border and increased the rough endoplasmic reticulum. It seemed to stimulate Golgi activity, but a variety of abnormal forms were p duced. Neither growth hormone nor prolactin for 23 days had any effect on growth. The defects i Golgi configuration, brush border carbohydrate c tent, and activity of the glycoprotein enzymes b to the brush border may all reflect impaired gly sylation in the hypophysioprivic state. The res of thyroxine or cortisone administration suggest that both may affect glycosylation but in differe ways.

7683 THE EFFECT OF S-2-(3-AMINOPROPYLAMINO) PHOSPHOROTHIOIC ACID (WR-2721) ON INTE NAL CRYPT SURVIVAL. II. FISSION NEUTRONS. (En

Sigdestad, C. P.; Connor, A. M.; Scott, R. M. (U Louisville Sch. Medicine, 500 South Floyd St., L ville, KY 40201). *Radiat. Res.* 65(3):430-439; 1

The ability of S-2-(3-aminopropylamino)ethylphos rothioic acid (WR-2721) to protect against fissi neutron irradiation was tested in the intestinal crypts of male C57/Bl 6-J mice. The mice were i jected i.p. with WR-2721 (500 mg/kg) at 0.25, 0. 1, 2, 4, 12, and 24 hr prior to neutron irradiat (300 rads). The mice were sacrificed 3 days lat Unirradiated mice had a mean level of 940 crypts while unprotected irradiated mice had 376 crypts WR-2721 pretreatment protected against the decre in crypts, and the protective efficacy peaked at about 1 hr after the injection; there was a rapid fall in this protective effect when WR-2721 was injected 12 hr prior to irradiation. Unprotected mice had a LD$_{50}$ of 253 rads, while mice pretreated with WR-2721 had a LD$_{50}$ of 392 rads. The dose modification factor (DMF), calculated as a ratio of protected to unprotected LD$_{50}$ values, was 1.6. The intestinal crypt survival curve in unprotected mice had a D$_0$ of 95 rads, with a shoulder of 156 rads. In the curve of pretreated mice, the D$_0$ was 154 rads, which was significantly different from the control curve. The DMF, calculated as a ratio of equally effective doses to reduce crypt survival to 50% of control level, was 1.3. Studies of the effect of WR-2721 on cellularity revealed that the mean unirradiated control values of disintigrations per min (dpm) per crypt and per milligram of intestine were 13.2 and 12,496 dpm, resp.; WR-2721 protected the intestine from about 120-140 rads of fission neutrons, resulting in a DMF between 1.4 and 1.5. The results demonstrate the ability of WR-2721 to protect the intestinal mucosa against fission neutron irradiation.

7684 SCANNING ELECTRON MICROSCOPY OF MOUSE INTESTINAL MUCOSA AFTER COBALT 60 AND D-T NEUTRON IRRADIATION. (Eng.) Hamlet, R.; Carr, K. E.; Toner, P. G.; Nias, A. H. W. (Glasgow Inst. Radiotherapeutics and Oncology, Belvidere Hosp., Glasgow G31 4PG, Scotland). *Br. J. Radiol.* 49(583): 624-629; 1976.

The small intestinal epithelium of adult C3H mice was studied by scanning electron microscopy (SEM) 3.5 days after exposure to single doses of D-T neutrons (0-1,000 rads) or ^{60}Co gamma irradiation (0-2,000 rads). Dose response curves of crypts per circumference for both sources of irradiation had similar slopes (D$_0$=180 for gamma irradiation and 150 for neutrons), and both curves showed large shoulders. The first significant deviation from the shoulder occurred at approximately 1,000 rads for ^{60}Co irradiation and at about 500 rads for D-T neutrons. With gamma irradiation, the first changes seen with SEM occurred after doses of 300 rads and consisted of minor distortion at the tips of some villi. Early changes were observed after 170 rads of neutrons had been given and consisted of slight swelling and broadening of the villi and a distinct irregularity of surface creases. At shoulder doses, gamma irradiation produced inconsistent orientation of the villi and clumping of groups of villi. Individual villi were more often bent or twisted than in control samples, and the villi tips were often misshapen to a greater degree than their proximal portions. Shoulder doses of D-T neutrons produced irregularity in the disposition of the surface markings and a more conical villus profile than in controls or gamma-irradiated villi. With both types of irradiation, the morphological changes intensified with increasing doses. It is concluded that SEM provides a more sensitive indicator of mucosal irradiation damage at low dose levels than conventional quantitative techniques. It is also suggested that mucosal morphology may provide a means of discriminating between the effects of different types of radiation at dose levels which are radiobiologically equivalent on certain quantitative scales.

7685 KINETICS AND POSSIBLE REGULATION OF CRYPT CELL POPULATIONS UNDER NORMAL AND STRESS CONDITIONS. (Eng.) Potten, C. S. (Christie Hosp. and Holt Radium Inst., Manchester M20 9BX, England). *Bull. Cancer (Paris)* 62(4):419-430; 1975.

Studies of the proliferative organization of mouse intestinal epithelial crypts are reviewed. About half of the 250-260 crypt cells are proliferative cells. The lower portion of the crypt contains about 40-50 relatively dormant cells and 10-15 functional Paneth cells. Several studies have suggested that the lower portion of the crypt contains a minority population of cells that are true stem cells, i.e., they provide an input of cells for the larger proliferative compartment higher up the crypt. The presumptive stem cells may be pluripotent and produce Paneth, goblet, and columnar cells. They are probably also the cells that are capable of regenerating the crypt after x-ray depopulation. Radiobiological experiments indicate that the number of cryptogenic cells is less than 80, while the results of several kinetic experiments indicate that the number of stem cells is about 20. The stem cells are located in the Paneth cell zone of the crypt, and are apparently passing through the cell cycle at about half the speed of the proliferative cells. It is these vital stem cells that will determine the response of the mucosa to therapeutic agents, probably play a role in carcinogenesis, and play a dominant role in mechanisms controlling cell proliferation.

7686 THE TIME-COURSE OF CHANGES IN MUCOSAL ARCHITECTURE AND EPITHELIAL CELL PRODUCTION AND CELL SHEDDING IN THE SMALL INTESTINE OF THE RAT FED AFTER FASTING. (Eng.) Clarke, R. M. (Dept. Human Morphology, Univ. Park, Nottingham NG7 2RD, England). *J. Anat.* 120(2):321-327; 1975.

The time course of changes in mucosal architecture and epithelial cell production and cell shedding in the small intestine of rats fed after fasting was investigated. Male albino Wistar rats were starved for 3 days and then allowed access to low-residue food. Controls continued to fast. Villus height, crypt depth, crypt/villus ratio, rate of cell production per crypt, and number of epithelial cells shed per villus in 5 min were measured in both groups 0.5, 1, 2, 4, 6, 9, 12, 16, and 24 hr after refeeding. Villus height increased 2 hr after refeeding and was significantly greater than starved controls (400 and 350 μm, resp., $p<0.05$). Crypt depth changed less dramatically, and the crypt/villus ratio was unchanged. The number of shed cells per villus was reduced within 0.5 hr of refeeding ($p<0.05$ for 0.5- and 1-hr values), and remained at a low level until 3 hr. At 9 hr, this number was significantly increased (i.e., 65 cells versus 32 in control $p<0.01$). The cell production rate in refed rats was not increased until 12 hr, when it rose to 23.3 cells/crypt/hr, significantly greater than controls

(11.3, p=0.02). No evidence for a reserve of cells in G_2 was found, and the 3-hr lag between the increases in cell shedding and cell production would probably not give enough time for cells in G_1 to pass through S and G_2. In conclusion, these observations do not support the hypothesis that increased cell shedding from the top of the villus stimulates increased cell production in the crypts of Lieberkuhn.

7687 ORGANIZATION OF AN ACTIN FILAMENT-MEMBRANE COMPLEX: FILAMENT-POLARITY AND MEMBRANE ATTACHMENT IN THE MICROVILLI OF INTESTINAL EPITHELIAL CELLS. (Eng.) Mooseker, M. S.; Tilney, L. G. (Dept. Biology, Univ. Pennsylvania, Philadelphia, PA 19174). *J. Cell. Biol.* 67(3):725-743; 1975.

The brush border of chicken intestinal epithelial cells was investigated to gain further information about the interaction of actin filaments with membranes. Through the analysis of isolated, demembranated brush borders decorated with the myosin subfragment, S_1, all the microvillar actin filaments were found to have the same polarity. The S_1 arrowhead complexes pointed away from the site of attachment of actin filaments at the apical tip of the microvillus membrane. In addition to the end-on attachment of actin filaments at the tip of the microvillus, these filaments were also connected to the plasma membrane all along their lengths by periodic (33 nm) cross bridges. These bridges were best observed in isolated brush borders incubated in high concentrations of Mg^{++} (10-40 nM). Their visibility was attributed to the induction of actin paracrystals in the filament bundles of the microvilli. Evidence for the presence of myosin-like filaments in the terminal web region of the brush border was obtained.

7688 ELECTRON MICROSCOPY OF KUPFFER CELLS IN THE ORTHOTOPIC PORCINE LIVER HOMOGRAFT DURING THE LATE STAGE AFTER TRANSPLANTATION (PHAGOCYTOSIS OF HOST CELLS BY KUPFFER CELLS). (Eng.) Cossel, L. (Pathologisches Institut der Karl-Marx Universitat, Liebigstrasse 26, 701 Leipzig, E. Germany). *Exp. Pathol. (Jena)* 11(3/4):168-181; 1975.

Electron microscopical observations of macrophages (Kupffer cells) in an orthotopic porcine liver homograft in the late stages after transplantation are described. The tissue was removed by exploratory excision made during laparotomy 138 days after transplantation. Numerous macrophages were found on the surface of, or within the endothelial sinusoid lining. Their preferential position was in the periphery of the lobe. The macrophages had a variable number of microvilli- or pseudopodia-like processes. They contained roundish or elongated nuclei with relatively deep indentations, focally dilated perinuclear spaces, a well-developed endoplasmic reticulum with focally enlarged cisterns, numerous ribosomes, large Golgi complexes, numerous vesicles, vacuoles, polymorphous cytosomes, and elongated mitochondria. Close topographical relations of the macrophages to hepatocyte debris, RBC, thrombocytes, granulocytes and lymphocytes, with contact of their cell membranes, were found. Light and electron microscopy demonstrated features of a late rejection, i.e., chronic aggressive hepatitis with transition to cirrhosis. The results showed that in late stages after liver transplantation, at the time of compensated function during late rejection, both phagocytosis and a degradation of erythrocytes, thrombocytes, and probably, also lymphocytes by the macrophages occur.

7689 MORPHOMETRIC STUDIES ON THE RAT LIVER IN BILIARY OBSTRUCTION. (Eng.) Yamauchi, H.; Koyama, K.; Otowa, T.; Ouchi, K.; Anezaki, T.; Sato, T. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 119(1):9-25; 1976.

Morphometric studies were carried out in the livers of Wistar rats with biliary obstruction. The common bile ducts were ligated and severed, and liver biopsies were done weekly for 7 postoperative weeks. With persistent biliary obstruction, the tissue constituents of biliary ducts proliferated markedly, and the volume ratio of the hepatic parenchyma showed a drastic decrease with time. The elevated mean sectional area of the nucleus, the increased mitotic index, and the unchanged estimated weight of the hepatic parenchyma after biliary obstruction suggested that lost hepatocytes were compensated for by regeneration. In the livers with biliary obstruction, the mitochondria were swollen and increased in number. In addition, the cristae were irregularly oriented and tortuous. Dilatation of the rough and smooth endoplasmic reticulum, dilation of the bile canaliculi, and increased numbers of lysosomes were also found. In controls, mitochondrial counts were 50-60%, and the volume index was 18.0%; in the livers with biliary obstruction, these levels were increased to 70-80% and 25.0%, resp. These increases corresponded to the duration of biliary obstruction. The results suggest that there is mitochondrial hypofunction in the hepatocytes of cholestatic livers.

7690 MORPHOMETRIC ANALYSIS OF PANCREATIC ACINAR CELLS FROM ORALLY FED AND INTRAVENOUSLY FED RATS. (Eng.) Pavlat, W. A.; Rogers, W.; Cameron, I. L. (Dept. Anatomy, Univ. Texas Health Science Center at San Antonio, San Antonio, TX 78284). *J. Surg. Res.* 19(4):267-276; 1975.

The effects of 1 week of total parenteral (i.v.) nutrition on the pancreatic acinar cells of four male Buffalo rats were investigated. Four other rats were fed p.o. (controls). Stereological morphometric analysis of the cells showed that the relative nuclear volume of both groups of rats was not significantly different. The ergastoplasmic region of the i.v. fed rats occupied a significantly ($p<0.05$) smaller amount of the total acinar cell volume than the controls. Conversely, the zymogenic region of the i.v. group was significantly ($p<0.05$) increased. The average volumes (in μm^3) of the cellular components for controls and i.v. fed rats were: cell volume, 22.230, 10,295; mean nuclear volume, 941, 475; cytoplasmic volume, 21,289, 10,450; zymogenic region (electron microscopy level), 5.269, 3.418;

ergastoplasmic region, 16,020, 7,032; zymogenic region (1-μm thick sections), 6,502, 4,450; and ergastoplasmic region, 14,836, 6000; resp. Apparently, the cells of i.v. fed rats maintain an adequate store of zymogen and simultaneously show morphological evidences of lower synthetic activity. Total i.v. feeding may be of use in treating pancreatic disease by relieving the acinar cells of their normal function, allowing healing to occur.

7691 ELECTRON MICROSCOPIC STUDY OF ACINAR CELLS OF THE SUBMAXILLARY SALIVARY GLANDS OF ALBINO RATS. (Rus.) Kalinin, V. I.; Nevorotin, A. I. (Dept. Therapeutic Stomatology, Central Res. Lab., Pavlov First Medical Inst., Leningrad, USSR). *Arkh. Anat. Gistol. Embril.* 68(7):63-67; 1975.

7692 HISTOCHEMICAL AND ULTRASTRUCTURAL ALTERATIONS OF THE DUODENUM IN ACUTE HYPOXIA. (Eng.) Jozsa, L.; Szekely, O.; Reffy, A. (National Inst. Traumatology, H 1430 Budapest, P.O. Box 21, Hungary). *Z. Exp. Chir.* 9(3):168-179; 1976.

7693 MORPHOLOGICAL ANALYSIS OF THE PHENOMENON OF DENUDING OF THE VILLI IN ENTERIC FORM OF ACUTE RADIATION SICKNESS. (Rus.) Parshkov, E. M.; Brodsky, R. A. (Res. Inst. Radiology, USSR Acad. Medical Sciences, Obninsk, USSR). *Biull. Eksp. Biol. Med.* (11):113-116; 1975.

7694 MORPHOMETRIC STUDIES ON THE DEVELOPMENT OF INTESTINAL MUCOSAL ATROPHY. (Eng.) Menge, H.; Robinson, J. W. L.; Mirkovitch, V. (Centre Hospitalier Universitaire Vaudois, 1011 Lausanne, Switzerland). *Biol. Gastroenterol. (Paris)* 8(4):339-343; 1975.

7695 EMBRYOLOGY AND AGEING AFFECTS. (Eng.) Hollander, C. F. *In: Mouse Hepatic Neoplasia. Proceedings of a Workshop held at the H. T.S. Management Center, Land End, High Wycombe, Great Britain, 12-17 May, 1974.* (Rijkswijk-ZH, Netherlands): pp. 7-19; 1975.

7696 STATISTICAL STUDY OF ULTRASTRUCTURE OF RAT EXOCRINE PANCREAS AFTER 30 MONTHS OF CHRONIC ALCOHOLISM. (Eng.) Lechene de la Porte, P.; Tasso, F.; Clop, J.; Sarles, H. (Unite de Recherches de Pathologie Digestive, INSERM U-31, 46 chemin de la Gaye, F 13009 Marseille, France). *Biol Gastroenterol. (Paris)* 8(4):364; 1975.

7697 SIZE AND DENSITY OF OLIGODENDROGLIAL NUCLEI IN RATS WITH CCl_4-INDUCED **LIVER DISEASE**. (Eng.) Diemer, N. H. (Inst. Neuropathology, Univ. Copenhagen, Juliane Mariesvej 16, DK-2100 Copenhagen, Denmark). *Neurobiology* 5(4):197-206; 197

See also, 7760, 7862, 7863, 7876, 7878, 7880, 7885, 7886, 7890, 7895, 7896, 7897, 8071, 8213.

ABSORPTION - EXCRETION - TRANSPORT

7698 EFFECT OF ACUTE INTESTINAL OBSTRUCTION ON THE LEAKAGE OF ALBUMIN FROM BLOOD INTO THE SMALL INTESTINE. (Eng.) Herczeg, B. (First Dept. Surgery, Semmelweis Univ. Medical Sch., Budapest, Hungary). *Acta Chir. Acad. Sci. Hung.* 16(1):27-37; 1975.

The effect of a simple, low intestinal obstruction on the leakage of ^{131}I-serum albumin from the circulation into the intestine was investigated in dogs. A median laparotomy was performed 24 hr after administration of 100 μCi human ^{131}I-albumin. Portions of the duodenum, jejunum, and ileum were separated, clamped, and catheterized. The intestine was filled with a 5-mg/ml labeled albumin solution and, after 2 hr, the clamps and catheter were removed and the intestine was ligated at the terminal ileum to obstruct the intestinal canal. The experiment was repeated 5 days later. Perfusate samples were precipitated with equal volumes of 20% trichloroacetic acid (TCA), 5% phosphotungstic acid (PWA), and 10% $AgNO_3$. The presence of albumin was demonstrated in every segment examined on the basis of solubility of the TCA precipitate in 95% ethanol and by paper electrophoresis. In the distended segment of the intestine above the ligation, a threefold increase in protein-bound radioactivity, from a normal value of 0.082 to 0.267 ml/10 cm intestine/hr, was observed. Albumin leakage values did not change in the duodenum and jejunum, which were not as involved in the distension, and in the ileal segment below the ligation. The increased albumin leakage observed during intestinal obstruction resulted in a 33% increase in total catabolism.

7699 ABSORPTION FROM A MIXTURE OF SEVENTEEN FREE AMINO ACIDS BY THE ISOLATED SMALL INTESTINE OF THE RAT. (Eng.) Gardner, M. L. G.

)ept. Biochemistry, Univ. Edinburgh Medical Sch., eviot Place, Edinburgh EH8 9AG, Scotland). *J. Phyiol. (Lond.)* 255(2):563-574; 1976.

he absorption and secretion from a mixture of 17 ree amino acids at low concentration (1.6 mM total) ere measured in isolated perfused rat small intesine to determine the absorption mechanism. The cid mixture, which approximated the free amino acid raction of casein hydrolysate, included: aspartic cid, threonine, serine, glutamic acid, proline, lycine, alanine, valine, methionine, isoleucine, eucine, tyrosine, phenylalanine, histidine, lysine, rginine, and tryptophan. The absorption rate of n amino acid was found to be proportional to its oncentration in the perfusate and independent of its hemical constitution. Individual ratios were not ignificantly different (p>0.02) than those observed reviously, when the perfusate contained peptides s well as amino acids. Amino acids were concenrated an average of six times during passage across he mucosa, and the free amino acid composition of he secretion into the tissue fluid was very similar o that of the luminal perfusate. Peptides do not ppear to be added to the tissue fluid during absorpion of free amino acids. It is concluded that the echanisms for free amino acid absorption are indeendent of those for peptide absorption.

700 THE POTENTIAL ROLE OF PROTEIN IN THE ABSORPTION OF FAT. (Eng.) Meyer, J. H.; Stevenon, E. A.; Watts, H. D. (Veterans Admin. Hosp., 16111 lummer St., Sepulveda, CA 91343). *Gastroenterology* 0(2):232-239; 1976.

tudies were carried out to test the ability of proeins and various protein digests to stabilize emulions of triglyceride, the susceptibility of such rotein-stabilized emulsions to lipolysis, and the apability of rats lacking luminal bile salts to bsorb fat from perfused emulsions of triglyceride tabilized with protein. When triglyceride emulsions ere allowed to stand at 68 F with various proteins, rotein digests, or taurocholate, considerably more at remained dispersed over a 2 min-2 hr period than hen the triglycerides were emulsified in saline or mino acid solutions. Sodium taurocholate (10 mM) tabilized corn oil emulsions considerably better than did protein or protein digests, and significantly more fat remained dispersed after 2 hr (27%). Corn oil (5.0 ml) was emulsified in 25 ml of 0.15 M NaCl, 25 ml of exogenous protein [bovine serum albumin (0-15.4 mg/ml) or a 1:1 mixture of bovine hemoglobin with ovalbumin (0-18.2 mg/ml)], or 25 ml of pancreatic or Heidenhain pouch juice diluted in various volumes of 0.15 M NaCl (endogenous protein). Proteins from both exogenous and endogenous sources effectively stabilized the triglycerides, and with all proteins, there was a significant correlation between the percentage of corn oil emulsified and the protein concentration in the aqueous (bulk) phase. This phenomenon of emulsion stabilization by protein was not confined to triglycerides high in unsaturated fatty acid content, as the bovine hemoglobin/ovalbumin mixture (HB-OV) also stabilized emulsions made from triglycerides high in saturated fatty acids (2:1 lard-corn oil mixture). Peptic digestion of the HB-OV did not alter the ability of the protein to stabilize corn oil emulsions. Further digestion with pancreatin resulted in a loss of the emulsifying power of HB-OV; however, the optical densities at 650 nm of the digest-stabilized emulsions were significantly greater ($p < 0.001$) than those of corn oil emulsified in saline. Emulsion stabilization by peptic digests of protein still persisted, despite alterations in pH from 1-7. Such emulsions were capable of being hydrolyzed by pancreatic lipase, and could be absorbed from the gut of bile-deficient rats. These emulsions also increased the initial rates of fat absorption from animals with an intact bile supply. It is concluded that the stabilization of luminal emulsions by dietary or endogenous protein may facilitate fat absorption similar to the manner in which detergent-stabilized emulsions have been previously shown to facilitate fat absorption.

7701 ROLE OF MEMBRANE COMPONENTS, GLYCOCALYX AND LIPID IN ABSORPTION OF WATER-SOLUBLE DYES FROM THE RAT SMALL INTESTINE. (Eng.) Nakamura, J.; Yoshizaki, Y.; Yasuhara, M.; Kimura, T.; Muranishi, S.; Sezaki, H. (Faculty Pharmaceutical Sciences, Kyoto Univ., Yoshida Shimoadachi-cho, Sakyoku, Kyoto, Japan). *Chem. Pharm. Bull. (Tokyo)* 24(4):691-697; 1976.

Investigations were made of the role of membrane components in the absorption of four water-soluble dyes, methylene blue (MB), bromthymol blue (BTB), bromphenol blue (BPB), and phenol red (PR), from the rat small intestine. Isolated small intestine from male Wistar albino rats was incubated for 30 min in 1 mg/ml papain and then for 5 min with 0.1 mM dye solution. Control tissues were not subjected to papain digestion. Uptake of MB, BTB, and BPB by the everted sac was reduced 14.0%, 21.3%, and 26.5%, resp., by digestion with papain. No effect was found with PR. In studies of the binding to the brush borders, papain reduced the binding of BPB and BTB significantly, but not MB and PR. Papain had similar effect on the uptake by isolated epithelial cells. When the binding to released components was examined, more MB and BTB were bound than BPB and PR, poorly absorbable dyes. The results suggest that the membrane component contributing to the dye binding to the brush borders is the glycocalyx (surface coat). Lipids, other major membrane components, were extracted from rat intestinal mucosa and separated into neutral lipid (NL), glycolipid (GL), phosphatidylcholine, and phosphatidylethanolamine fractions. Each fraction was dissolved in chloroform, and the partitioning behavior of the dyes was examined using a nonemulsifying system. The extent of dye transfer from the aqueous phase into the lipid fractions containing GL and total lipid (TL) was correlated to the extent of net absorption and tissue accumulation, resp. It is concluded that both lipid and glycoprotein contributed to the accumulation of dyes in the intestinal mucosa.

7702 EFFECT OF CALCIUM ON MAGNESIUM ABSORPTION.

(Eng.) Behar, J. (Dept. Medicine, Veterans Hosp., West Haven, CT 06516). *Am. J. Physiol.* 229(6):1590-1595; 1975.

The effect of Ca on Mg absorption in relation to changes in Na and water absorption was investigated in the rat ileum *in vivo.* Solutions of 150 mM NaCl, 5 mM KCl, 0.5-32 mM MgCl$_2$, and 0-4 mM CaCl$_2$ were perfused into the terminal ileum of male albino Charles River rats. An increase in Ca concentration from 2 to 4 mM led to a progressive decrease in the lumen-to-plasma transport of Mg at 0.5-0.32 mM Mg. The association of Mg transport and Mg concentration (0.5-0.16 mM) was linear for 2 mM Ca ($p<0.001$) and 4 mM Ca ($p<0.001$) and remained so up to 32 mM Mg and 4 mM Ca ($p<0.001$). Net Na and water absorption also decreased with increasing concentration of Ca. This effect of Ca was also observed when NaCl was replaced by urea. However, a consistent correlation was observed between the magnitude of net Mg absorption and the rates of net water absorption at all Ca concentrations. Ca probably decreases Mg absorption by reducing the membrane permeability to solutes that induce net water flow nonspecifically, regardless of type of transport. These findings are consistent with the concept that Mg is transported by solvent "drag." An increase of Ca in the lumen increased the tissue accumulation of Mg, which was associated with a decrease in net Na absorption and in the negativity of the transmural potential difference. An additional mechanism of Mg transport that operates independently of net water flow is suggested.

7703 ANALYSIS OF THE ROLE OF ENDOGENOUS PROLACTIN ON FLUID AND SODIUM CHLORIDE ABSORPTION BY THE RAT JEJUNUM.

(Eng.) Mainoya, J. R. (Dept. Zoology, Univ. Dar-es-Salaam, Dar-es-Salaam, Tanzania). *J. Endocrinol.* 67(3):343-349; 1975.

The influence of endogenous prolactin on intestinal absorption of fluid and NaCl was investigated in everted jejunal sacs of male Sparague-Dawley rats. Hypophysectomy in nine rats significantly decreased the mean levels of intestinal fluid absorption (0.57 ml/g wet weight/hr in jejunal segment III) and sodium transfer (54.8 μEq/g/hr) from those in controls (1.15 ml/g/hr and 137.5 μEq/g/hr, resp.). The chloride level was unchanged. Pituitary implantation in both normal and hypophysectomized rats increased fluid, sodium, and chloride absorption (1.88 ml/g/hr, 216.3 μEq/g/hr, and 103.3 μEq/g/hr, resp., in the normal animals with implant; 1.46 ml/g/hr, 173.8 μEq/g/hr, and 103.2 μEq/g/hr, resp., in hypophysectomized animals with implant). Treatment with s.c. estradiol benzoate (5.0 μg), reserpine (25.0 μg), or ergocryptine (60.0 μg) daily for 6 days resulted in increased fluid and sodium absorption. Chloride absorption was also significantly increased by these treatments. In hypophysectomized rats, the estrogen treatment had no effect on intestinal fluid or NaCl absorption. Although adrenalectomy produced no significant changes in absorption, treatment of adrenalectomized rats with prolactin (1.0 mg, 48 and 24 hr before sacrifice), estrogen, or reserpine enchanced fluid, sodium, and chloride transport. The mucosal fluid transfer was 0.90, 1.28, 1.26, and 1.42 ml/g/hr in controls and in adrenalectomized rats treated with prolactin, estrogen, and reserpine, resp.; the mucosal sodium transfer was 119.0, 174.6, 168.0, and 172.7 μEq/g/hr, resp.; and the mucosal chloride transfer was 42.4, 62.4, 70.8, and 65.0 μEq/g/hr, resp. It appears that the effects of ergocryptine in intact rats might be mediated via the pituitary-adrenocortical system, since it stimulated intestinal absorption in intact animals but had no effect on that in adrenalectomized rats. Corticosterone treatment (1.0 mg, s.c., 48 and 24 hr prior to sacrifice) alone significantly enchanced only sodium absorption (208.3 versus 147.7 μEq/g/hr in controls). Simultaneous administration of corticosterone and prolactin significantly enchanced both fluid and sodium transport. The data suggest that increased endogenous prolactin levels produce stimulatory effects on intestinal absorption of fluid and NaCl by the rat jejunum.

7704 A COMMON MECHANISM FOR TRANSPORT OF DI- AND TRI-PEPTIDES BY HAMSTER JEJUNUM IN VITRO.

(Eng.) Addison, J. M.; Burston, D.; Dalrymple, J. A.; Matthews, D. M.; Payne, J. W.; Sleisenger, M. H.; Wilkinson, S. (Westminster Medical Sch., London, England). *Clin. Sci. Mol. Med.* 49(4):313-322; 1975.

Transport interactions between amino acids, dipeptides, and tripeptides were studied in rings of everted hamster jejunum *in vitro.* Paired rings were incubated in Krebs-Ringer phosphate saline, each control ring accompanied by a test ring from an adjacent jejunal site of the same hamster. The effects of a variety of amino acids and peptides on the uptake of glycylsarcosylsarcosine (Gly-Sar-Sar) and of β-alanylglycylglycine (β-Ala-Gly-Gly) were studied. The uptake of Gly-Sar-Sar was not inhibited by methionine (Met) or by glycine (Gly), except at the high concentration of 60 μmol/ml. Its uptake was inhibited to 80% and 11% of the control values by 5 and 20 μmol/ml of Met-Met, resp.; to 53% and 13% of the control values by 5 and 20 μmol/ml of Gly-Gly; and to 53% and 23% of the control values by 5 and 20 μmol/ml of Gly-Gly-Gly, resp. Inhibition by Met-Met-Met (5 μmol/ml) was stronger (to 55% of control) than by equimolar Met-Met. *N*-acetyl-Gly-Gly (20 μmol/ml) inhibited the uptake to 83% of the control. Neither equimolar β-Ala nor equimolar histidine (His) affected Gly-Sar-Sar uptake. β-Ala-His (5 and 20 μmol/ml) inhibited uptake of Gly-Sar-Sar (69% and 39%, resp.). His-β-Ala (20 μmol/ml) inhibited uptake to 59% of the control. Gly-Sar-Sar uptake was inhibited to 68% of control by β-Ala-Gly-Gly (20 μmol/ml). Both Gly-Pro and Pro-Gly inhibited uptake of Gly-Sar-Sar, Gly-Pro much more strongly than Pro-Gly. Uptake was inhibited by Gly-Leu, and less strongly by Gly-D-Leu. Uptake was also inhibited to 44% of control by cephalexin (20 μmol/ml). Uptake of Gly-Sar-Sar was unaffected by 5 μmol/ml lysine (Lys) or Lys-Lys-Lys, but was inhibited to 58% of control by 5 μmol/ml Lys-Lys. Uptake was unaffected by 5 or 20 μmol glutamine (Glu) or Glu-Glu, whereas it was inhibited to 70% of control by 5 μmol/ml Glu-Glu-Glu. The results demonstrate that jejunal uptake of tripeptides is inhibited by dipeptides, which suggests that di- and tripeptides share an uptake mechanism. The inhibi-

on of uptake of Gly-Sar-Sar by β-Ala-Gly-Gly and
e inhibition of uptake of β-Ala-Gly-Gly by Gly-
r-Sar also suggest that tripeptides compete
ong themselves for uptake.

'05 THE EFFECT OF SALINE AND HYPERONCOTIC DEXTRAN INFUSION ON CANINE ILEAL SALT AND TER ABSORPTION AND REGIONAL BLOOD FLOW. (Eng.)

ilman, D.; Jordan, K. (Biology Dept., Univ. Hous-
n, Houston, TX 77004). *J. Physiol. (Lond.)*
2(1):97-113; 1975.

e unidirectional Na and H_2O fluxes, vascular pres-
ires, and total and absorptive site blood flows in
e canine ileum were determined before and during
v. saline infusion (9 g/l) and subsequent i.v.
fusion of 25% hyperoncotic dextran (77,000 molecu-
r weight). Continuous saline infusion in-
eased the unidirectional flux of Na and H_2O into
e ileal lumen and increased total blood flow (246%)
d venous pressure (67%). The net absorption of Na
d H_2O was decreased, primarily because of the in-
eased blood-to-lumen fluxes of Na and H_2O by 270%
d 38%, resp. After 150 min, the net control period,
absorption from saline at 0.82 μEq/g/min was con-
rted to a net secretion of 0.78 μEq/g/min. The
idirectional fluxes of Na and H_2O out of the lumen,
terial pressure, and the absorptive site blood flow
re not affected. Dextran infusion reversed most
the effects of saline infusion. There were no
gnificant effects of dextran on the net flux of Na
H_2O, the absorptive flux of Na, or total intesti-
l blood flow. The secretory fluxes of H_2O and the
sorptive site blood flow for the saline-perfused
gments were significantly decreased, but both ar-
rial and mesenteric vein pressures were signifi-
antly increased. The unidirectional fluxes of Na
d H_2O into the lumen were correlated significantly
ith Starling forces during saline infusion. It is
ncluded that intestinal transport of Na and H_2O
s subject to regulation by physical forces at the
apillary level.

706 DEMONSTRATION OF HYDROLASE-RELATED GLUCOSE TRANSPORT IN BRUSH BORDER MEMBRANE VESICLES REPARED FROM GUINEA PIG SMALL INTESTINE. (Eng.)

amaswamy, K.; Malathi, P.; Crane, R. K. (Dept.
hysiology, Coll. Medicine and Dentistry New Jersey,
ewark, NJ). *Biochem. Biophys. Res. Commun.* 68(1):
62-168; 1976.

he transport of glucose, derived from either sucrose
r glucose-1-phosphate (G-1-P), across osmotically
ctive brush border membrane vesicles from guinea
ig small intestine was studied to demonstrate hy-
rolase-related glucose transport. An imposed Na^+
radient enhanced the entry of glucose into the ves-
cles, and the dissipation of the sodium gradient with
ime coincided with the equilibration of glucose across
he vesicular membrane. When glucose uptake was
ompared with that of labeled sucrose, 72-81% of the
adioactivity associated with the vesicles was due to
glucose and the rest was unhydrolyzed sucrose. When the vesicles were incubated with sucrose and tromethamine, a strong competitive inhibitor of sucrase. total uptake was reduced to less than 40%, and the proportions of glucose and sucrose were reversed, demonstrating that unhydrolyzed disaccharide can occupy some portion of the vesicular space. Transport from 10 mM sucrose was compared to that from 1 and 10 mM G-1-P. The amount of glucose released from 10 mM sucrose at the end of 1 min was comparable to that released from 1 mM G-1-P at 40 sec and from 10 mM G-1-P at 20 sec. Comparing vesicular uptake in the presence of Na^+, the uptake from sucrose was 4.7 and 2.9 times greater than that from 1 mM and 10 mM G-1-P, resp. In the absence of Na^+, the corresponding values were 9.4 and 5.3. Even when the amount of glucose released was 3-fold greater from G-1-P (10 mM G-1-P at 1 min), the uptake of glucose from sucrose (10 mM at 1 min) predominated, being 1.5 times greater in the presence of Na^+ and 2.3 times greater in its absence. In the absence of sodium, total sugar uptake from 10 mM sucrose was 1,117 pmol/mg protein at the end of 1 min; correcting for intact sucrose entry, it was found that considerably more glucose from sucrose was transferred into the vesicles than that from G-1-P. This demonstrates that glucose transfer is attributable to hydrolase-related transport.

7707 EFFECTS OF FASTING AND SEMISTARVATION ON THE KINETICS OF ACTIVE AND PASSIVE SUGAR ABSORPTION ACROSS THE SMALL INTESTINE IN VIVO. (Eng.)

Debnam, E. S.; Levin, R. J. (Dept. Physiology, Royal Free Hosp. Sch. Medicine, Hunter St., London, WC1N 1BP, England). *J. Physiol. (Lond.)* 252(3):681-700; 1975.

The effects of fasting and semistarvation on the kinetics of absorption *in vivo* of glucose, galactose, and α-methyl glucoside were assessed electrically and chemically in the jejunum of male albino Sheffield rats and male Golden hamsters. The apparent K_m, maximum absorption (V_{max}, μmol/10 cm/15 min), and maximum potential difference (PD_{max}) were obtained for the jejunal electrogenic active-transfer mechanism from the transfer PD and chemical absorption data. Fasting for 3 days decreased the K_m markedly for all the sugars, but not for L-valine or L-methionine. Semistarvation had a less pronounced effect on the sugars. The diet-induced change in K_m for glucose was observed in both rats and hamsters. These effects may result from the increased affinity of the carriers for sugars during dietary restriction. The greater the restriction, the greater the increase. Fasting and semistarvation caused large reductions in V_{max}. These values were correlated with the reduction in enterocyte population, as estimated by changes in enterocyte column size. The reduction in V_{max} for galactose was mainly accounted for by a decrease in enterocytes; however, these two factors did not correlate for glucose. There were much greater reductions in V_{max} compared to column size. Reduced enterocyte metabolism or changes in the carriers may also be involved. Fasting and semistarvation had complex and differential actions on the PD_{max} for glucose. galactose, and α-methyl glucoside. They did not correlate with the changes in V_{max} measured chemically.

7708 SOME OBSERVATIONS ON THE POSSIBLE NUTRITIONAL SIGNIFICANCE OF VITAMIN B_{12}- AND FOLATE-BINDING PROTEINS IN MILK. ABSORPTION OF [^{58}Co]CYANOCOBALAMIN BY SUCKLING PIGLETS. (Eng.) Ford, J. E.; Scott, K. J.; Sansom, B. F.; Taylor, P. J. (National Inst. for Research in Dairying, Shinfield, Reading RG2 9AT, England). *Br. J. Nutr.* 34(3):469-492; 1975.

The absorption and retention of ^{58}Co-cyanocobalamin (CCB) and its partition within the body were investigated in Large White piglets at birth or at ages up to 56 days. CCB given at birth and at 7 days of age by stomach tube was efficiently absorbed from the intestine and retained within the body, mostly in the liver. Test doses of 10 and 0.5 μg were absorbed equally well, despite the absence of intrinsic factor in the gut. In piglets given 10 μg at ages between 0.5 and 56 days, the retention efficiency decreased markedly between about 7 and 21 days of age. Total liver vitamin B_{12} increased progressively from 4.2 μg at birth to 53.7 μg at 63 days. Liver folate content increased from 6.3 μg at birth to 242 μg at 35 days, after which it accelerated sharply (to 2,555 μg at 56 days). Vitamin B_{12}-binding capacity in the gastric mucosa increased with age, from 40 ng at birth to about 2,000 ng at 14 days and 7,000 ng at 35 days. This binder protein was largely endogenous, but much of the unsaturated binder protein in intestinal mucosa was apparently derived from milk. The chyme in the stomach and small intestine contained unsaturated binder protein, partly endogenous and partly derived from milk, which prevented uptake of added G-^{3}H-CCB into the solid phase of the intestinal contents. The intestinal chyme contained large numbers ($\log_{10}$ 7.0-9.1/ml) of bacteria, some of which were isolated and shown to take up CCB or folic acid or both. It is speculated that unsaturated vitamin binders in milk, in acting to sequester the milk folate and reduce the growth of folate-dependent bacteria in the intestine, would encourage the growth of bacteria that contribute to the host's folate nutrition.

7709 AN INVESTIGATION OF THE MECHANISMS RESPONSIBLE FOR A REDUCTION IN CAPILLARY FILTRATION COEFFICIENT IN THE INNERVATED CAT JEJUNUM ON INTRAVENOUS INFUSION OF HISTAMINE. (Eng.) Richardson, P. D. I. (Medical Coll., St. Bartholomew's Hosp., Charterhouse Square, London, EC1M 6BQ, U.K.). *J. Pharm. Pharmacol.* 27(11):868-870; 1975.

7710 CONCENTRATION AND TRANSPORT OF DIFFERENT SUGARS IN THE LYMPH OF THE THORACIC DUCT AND IN BLOOD OF THE PORTAL VEIN IN DOGS AFTER ENTERAL AND PARENTERAL ADMINISTRATION. (Eng.) Seifert, J.; Prols, H.; Messmer, K.; Bucklein, R.; Lob. G.; Mehnert, H.; Brendel, W. (Inst. Surgical Res., Surgical Clinic, Univ. Munich, Nussbaumstrasse 20, D 8000, Munich, W. Germany). *Digestion* 12(4/6):221-231; 1975.

7711 INTESTINAL SUGAR TRANSPORT: STUDIES WITH ISOLATED PLASMA MEMBRANES. (Eng.) Hopfer, U.; Sigrist-Nelson, K.; Murer, H. (Sch. Medicine, Case Western Reserve Univ., Cleveland, OH 44106). *Ann. N.Y. Acad. Sci.* 264:414-427; 1975.

7712 HEPATOCELLULAR UPTAKE OR ERYTHRITOL AND MANNITOL IN THE DOG. (Eng.) Glasinovic, J.-C.; Dumont, M.; Duval, M.; Erlinger, S. (INSERM, Hopital Beaujon, 92110 Clichy, France). *Am. J. Physiol.* 229(5):1455-1460; 1975.

7713 EFFECTS OF COMPOSITION AND CALORIC INTAKE OF DIETS ON HEXOSE ABSORPTION BY SMALL INTESTINE [Abstract]. (Eng.) Wilson, H.; Schedl, H. (Univ. Iowa Coll. Medicine, Iowa City, IA). *Clin. Res.* 24(1):46A; 1976.

7714 FOLATE ABSORPTION AND MALABSORPTION. (Eng.) Rosenberg, I. H. (Univ. Chicago Hosp., Chicago, IL 60637). *N. Engl. J. Med.* 293(25):1303-1308; 1975.

7715 TRANSPORT OF GLYCOPROTEINS IN THE MUCOUS SURFACE CELLS OF THE RAT STOMACH. (Eng.) Kramer, M. F.; Geuze, J. J. (Medical Sch., Univ. Utrecht, Netherlands). *Histochem. J.* 7(6):511-513; 1975.

7716 SMALL BOWEL ABSORPTION OF SULFASALAZINE (SASP) AND ITS ENTEROHEPATIC CIRCULATION [Abstract]. (Eng.) Zapp, B.; Fara, J.; Chowdhury, J. R.; Das, K. M. (Albert Einstein Coll. Medicine, Bronx, NY). *Clin. Res.* 24(3):514A; 1976.

7717 THE APPARENT ABSORPTION OF MINERALS IN THE SMALL AND LARGE INTESTINE OF GROWING PIGS [Abstract]. (Eng.) Partridge, I. G. (Natl. Inst. Res. Dairying, Shinfield, Reading RG2 9AT, England). *Proc. Nutr. Soc.* 34(2):47A-48A; 1975.

7718 CHOLERESIS AND HEPATIC TRANSPORT MECHANISMS: II. INFLUENCE OF BILE SALT CHOLERESIS AND BILIARY MICELLE BINDING ON BILIARY EXCRETION OF VARIOUS ORGANIC ANIONS. (Eng.) Vonk, R. J.; Jekel, P.; Meijer, D. K. F. (Dept. Pharmacology, State Univ. Groningen, Bloemsingel 1, Groningen, Netherlands). *Naunyn-Schmiedeberg's Arch. Pharmacol.* 290 (4):375-387; 1975.

19 SHORT-TERM FASTING AS A POSSIBLE SOURCE OF SPURIOUS RESULTS IN IRON ABSORPTION STUDIES bstract]. (Eng.) Beilby, J. A.; Kaldor, I. (Dept. ysiology, Univ. Western Australia, Australia). *in. Exp. Pharmacol. Physiol.* 3(3):248-249; 1976.

20 ABSORPTION AND EXCRETION OF ZINC, CADMIUM AND MERCURY IN THE GASTROINTESTINAL TRACT. ng.) Shibata, H. (Natl. Inst. Radiological Scien- s, Anagawa, Chiba-Shi, Japan). *Radioisotopes* 24 0):679-683; 1975.

7721 LIVER UPTAKE OF TAUROCHOLATE (TC), D-GALACTOSE (DGAL) AND ALBUMIN MICROAGGREGATES (AMA) IN THE DOG [Abstract]. (Eng.) Huet, P. M.; Viallet, A. (Hopital Saint-Luc, Montreal, Canada). *Clin. Res.* 23(5):622A; 1975.

See also, 8037, 8157, 8175.

MOTILITY

22 THE ADRENO-MEDULLARY EFFECT ON GASTROINTESTINAL PROPULSION AFTER LAPAROTOMY. EXPERIMENTAL STUDY IN THE RAT. (Eng.) Ohrn, -G.; Johansson, H.; Nilsson, F. (Univ. Hosp., S-750 Uppsala, Sweden). *Acta Chir. Scand.* 142(Suppl. 1);19-29; 1976.

e effects of adrenalectomy and adrenal demedul- tion on the rates of gastric evacuation and all intestinal propulsion following laparotomy re investigated in male Sprague-Dawley rats. am-operated controls, in which the adrenals were rely exposed, were also studied. Laparotomy was rformed 7 days after adrenal or sham surgery, and strointestinal propulsion was studied 15 hr ter laparotomy. None of the procedures induced gnificant body weight alterations; serum electro- tes were unaffected by adrenalectomy. After renalectomy and adrenal demedullation, the corti- steroid plasma levels were significantly reduced, e concentrations after total adrenalectomy being e lowest. Laparotomy did not affect the plasma rticosteroid levels. Gastric evacuation was gnificantly increased in nonlaparotomized animals bjected to adrenalectomy ($p<0.001$) and adrenal emedullation ($p<0.05$) compared to nonlaparotomized am-operated controls. Laparotomy significantly etarded gastric evacuation in the sham-operated roup ($p<0.001$), but did not alter gastric evacua- ion in the adrenalectomized and adrenal demedullated roups. Small bowel propulsion did not differ etween nonlaparotomized rats subjected to adrena- ectomy, adrenal demedullation, or sham operation. e propulsion was significantly retarded ($p<0.01$) n the laparotomized sham-operated animals, but as unaffected in the laparotomized adrenalectomized nd adrenal demedullated animals. It is concluded hat adreno-medullary activity retards gastro- ntestinal propulsion, not only postoperatively, ut also in intact rats.

723 EFFECT OF CHEMICAL SYMPATHECTOMY (6-HYDROXYDOPAMINE) ON GASTROINTESTINAL PROPULSION FTER LAPAROTOMY: AN EXPERIMENTAL STUDY IN THE RAT. (Eng.) Ohrin, P.-G.; Rentzhog, L. (Univ. Hosp., S-750 14 Uppsala, Sweden). *Acta Chir. Scand.* 142(Suppl. 461):31-42; 1976.

The effects of 6-hydroxydopamine pretreatment or adrenal demedullation on the inhibition of gastrointestinal propulsion following laparotomy were studied in Sprague-Dawley rats to determine whether the postoperative inhibition is due to the activation of peripheral sympathetic nerves. The animals were pretreated with 6-hydroxydopamine (50 mg/kg at 15 or 48 hr or 150 mg/kg at 48 hr, i.v.) before the evaluation of gastrointestinal propulsion. Treatment with 6-hydroxydopamine did not prevent postoperative retardation of gastric evacuation and small bowel propulsion. On the contrary, 6-hydroxydopamine in itself seemed to retard gastrointestinal propulsion. In simultaneously adrenal demedullated rats, no further retardation of propulsion was produced by the laparotomy. The results indicate that the adreno-medullary discharge is important in the postoperative inhibition of gastrointestinal propulsion.

7724 CATECHOLAMINE INFUSION AND GASTROINTESTINAL PROPULSION IN THE RAT. (Eng.) Ohrn, P.-G. (Univ. Hosp., S-750 14 Uppsala, Sweden). *Acta Chir. Scand.* 142(Suppl. 461):43-52; 1976.

The effects of continuous i.v. infusions of adrenalin (A), noradrenalin (NA), and saline on gastric evacuation and small bowel propulsion were studied in male Sprague-Dawley rats to confirm the inhibitory effect of circulating catecholamines on gastrointestinal propulsion. The rats received 4 μg/ml (2 ml/hr) of noradrenalin or adrenalin, beginning 15 min before the administration of a test meal. The amount of the test meal evacuated from the stomachs of the A-treated, NA-treated, and control rats was 68.6%, 69.8%, and 82.7%, resp. The small bowel length passed by 50% and 25% of the test meal was significantly shorter in the A-treated rats (62.3% and 67.9%, resp.) and in the NA-treated rats (62.8% and 68.5%, resp.) than in the controls (67.5% and 74.5%, resp.). However, there was no difference in small bowel length passed by 75% of the test meal. The results indicate that both gastric evacuation and small bowel propulsion are significantly inhibited by the infusion of catecholamines.

7725 EFFECT OF ADRENERGIC BLOCKADE ON GASTROINTESTINAL PROPULSION AFTER LAPAROTOMY: AN EXPERIMENTAL STUDY IN THE RAT.

(Eng.) Ohrn, P.-G.; Rentzhog, L. (Univ. Hosp., S-750 14 Uppsala, Sweden). *Acta Chir. Scand.* 142(Suppl. 461):53-64; 1976.

The effects of alpha- and beta-adrenergic blockade on the retardation of gastrointestinal propulsion following laparotomy were studied in male Sprague-Dawley rats. Gastric evacuation was reduced 15 hr after laparotomy, only 74.7% of a test meal being evacuated. The intestinal propulsion was calculated as the percentage of small bowel length passed by 75%, 50%, and 25% of the activity deposited into the duodenum; these levels after laparotomy were 57.2%, 64.4%, and 69.2%, resp. Gastric evacuation after laparotomy was significantly improved by alpha blockade with phenoxybenzamine (3 mg/kg, i.v.), the mean gastric evacuation being 92.7%. The gastric evacuation in nonlaparotomized, phenoxybenzamine-treated animals was 92.0%. No differences in small bowel length passed by 75% and 50% of the test meal were found between the groups, irrespective of phenoxybenzamine treatment plus laparotomy, phenoxybenzamine alone, or laparotomy alone. A significantly shorter part of the small bowel was passed by 25% of the test meal in the laparotomized animals not subjected to phenoxybenzamine pretreatment compared to the pretreated laparotomized animals (75.0%). In a second series of experiments, gastric evacuation was significantly reduced in the untreated control group after laparotomy (68.4% of test meal evacuated). Beta blockade with propranolol (5 mg/kg x 2, s.c.) did not prevent the reduction of gastric evacuation after laparotomy. Small bowel propulsion was significantly retarded in untreated controls after laparotomy. There was no significant difference between the laparotomized groups, irrespective of beta-blocking treatment. However, when the small bowel propulsion in the propranolol-treated laparotomized group was compared with that of the corresponding propranolol-treated nonlaparotomized group, no significant difference was found. These studies indicate that the postoperative retardation of gastric evacuation depends mainly on adrenal discharge of catecholamines that directly stimulate inhibitory alpha-receptors in the stomach.

7726 EFFECTS OF SYMPATHO-ADRENAL ACTIVITY AND PHARMACOLOGICAL TREATMENT ON GASTROINTESTINAL PROPULSION IN THE EARLY POSTOPERATIVE PERIOD. AN EXPERIMENTAL STUDY IN THE LAPAROTOMIZED RAT.

(Eng.) Ohrn, P.-G.; Rentzhog, L.; Wikstrom, S. (Univ. Hosp., S-750 14 Uppsala, Sweden). *Acta Chir. Scand.* 142(Suppl. 461):65-76; 1976.

The effects of various sympatho-adrenal manipulations on gastrointestinal propulsion after laparotomy were investigated in male Sprague-Dawley rats. Following laparotomy, there was a significant retardation of gastric evacuation and of small bowel propulsion. Neither adrenal demedullation 7 days before laparotomy nor chemical sympathectomy with 6-hydroxydopamine (150 mg/kg, i.v., 46 hr before operation) had any effect on gastric evacuation after surgery. Gastric evacuation was not affected by treatment with neostigmine (0.1 mg/kg, s.c), phenoxybenzamine (3 mg/kg, i.v.), or metoclopramide (3 mg/kg, s.c.). Chemical sympathectomy abolished the postoperative retardation of small bowel propulsion, and treatment with metoclopramide significantly improved, but did not abolish, retardation. Neostigmine, phenoxybenzamine, and adrenal demedullation did not affect the slowed intestinal propulsion. In 5 of 16 neostigmine-treated animals and in 4 of 16 animals subjected to adrenal demedullation, significant duodenal-gastric reflux was observed after administration of a duodenal test meal. The results indicate that it is difficult to influence the inhibited gastric evacuation therapeutically in the early postoperative period; however, the inhibition of small bowel propulsive motility is less pronounced.

7727 GASTRIC EMPTYING OF LIQUIDS AFTER DIFFERENT VAGOTOMIES AND PYLOROPLASTY.

(Eng.) Gleysteen, J. J.; Burdeshaw, J. A.; Hallenbeck, G. A. (Dept. Surgery, Univ. Alabama, Birmingham, AL). *Surg. Gynecol. Obstet.* 142(1):41-48; 1976.

The relative rate of gastric emptying of liquids (0.1 N sodium citrate, 5% dextrose, 10% dextrose, 0.05 N HCl, and 10 mN sodium oleate buffered in 0.1 N sodium citrate), after different vagotomies and pyloroplasty was determined in 10 mongrel dogs. Measurements wer made during the first brief phase after ingestion and during the second longer exponential phase of emptyin using intact dogs and dogs after a Heinecke-Mikulicz pyloroplasty, proximal gastric vagotomy without drainage, total gastric-selective gastric vagotomy plus pyloroplasty (SG-V-P), and total abdominal-truncal vagotomy plus pyloroplasty (TV-P). Pyloroplasty alon did not change the emptying rate of the liquids. Whe compared across operations, there was a significant difference in emptying among individual meals for bot the initial rate (p<0.0001) and the basic relative rate (p<0.0001). Initial emptying after all three vagotomies was significantly faster than control rates, with progressive rate increases when proximal gastric vagotomy is compared with SGV-P and with TV-P. The basic exponential pattern of emptying was not lost after any of the operations. The basic rate after proximal gastric vagotomy and SGV-P was nearly identical, slightly delayed from the control rate, and significantly slower than the more rapid rate after truncal vagotomy with pyloroplasty. These results imply the importance of the hepatic and celiac vagal fibers, sectioned only with truncal vagotomy, in the regulation of gastric emptying of liquid.

7728 EFFECT OF ISCHEMIC ANOXIA ON ELECTRICAL AND MECHANICAL ACTIVITY OF THE TOTALLY ISOLATED PORCINE STOMACH.

(Eng.) Kowalewski, K.; Zajac, S.; Kolodej, A. (Surgical-Medical Res. Inst., Univ. Alberta, Edmonton, T6G 2H7, Alberta, Canada); *Eur. Surg. Res.* 8(1):12-25; 1976.

The effect of ischemic anoxia on the electrical and mechanical activity of the isolated porcine stomach perfused with homologous blood was investigated. Stagnant, complete ischemia was produced by closing the gastric artery and vein for various periods of time up to 3 hr. After a given period of ischemia, the blood was recirculated for 10 min and then pentagastrin (5 µg/ml/min) was injected into the gastric artery. The vagus nerve was also electrically stimulated at various stages of anoxia and recirculation. After up to 90 min of ischemia, stomachs were able to demonstrate low-frequency electrical control activity after 10 min of blood recirculation. After injection of pentagastrin, however, electrical control activity rapidly became normal. When ischemia lasted 120 min or longer, recirculation of blood did not induce reappearance of electrical control activity, but again pentagastrin injection produced a normal response. After ischemia of 240 min duration or longer, recirculation and pentagastrin had no effect. This experimental study may have some clinical significance, as normothermic stagnant ischemia of a few hours' duration does occur under clinical conditions.

7729 THE EFFECTS OF SOME PHARMACOLOGICALLY ACTIVE AMINES ON THE RATE OF GASTRIC EMPTYING IN RATS. (Eng.) Bridges, J. W.; Dent, J. G.; Johnson, P. (Univ. Surrey, Guildford, England). *Life Sci.* 18(1): 97-107; 1976.

The effects of some pharmacologically active anticholinergic and nonanticholinergic amines on the rate of gastric emptying were studied in Wistar rats. All compounds were administered by gastric intubation at 0.2 mmol/kg. In one series of experiments, the test compound and polyethylene (1,2-^{14}C)-glycol (^{14}C-PEG, 5 mg) were administered together or ^{14}C-PEG was administered 45 min after the test compound. Compounds with anticholinergic activity (amitriptyline, nortriptyline, imipramine, desmethylimipramine, 3-methylamino-1:1-diphenyl-prop-1-ene and its primary and tertiary amine analogues, dexamphetamine and methylamphetamine) all inhibited gastric emptying of PEG. The mean percentage of marker retained in the controls was 0.4, while the percentages retained in the animals treated with the anticholinergic compounds were 14.1%, 36.0% ($p>0.001$), 24.3% ($0.1>p>0.001$), 39.0% ($0.1>p>0.001$), 11.8%, 9.2% ($0.05>p>0.01$), and 15.6%, resp. Compounds with little or no anticholinergic activity (phenobarbitone, piperazine, oxyphenylbutazone, and trimethoprim) had no effect on gastric emptying. The activity of the compounds in inhibiting gastric emptying falls in approximately the same order as their anticholinergic activity, lending support to the hypothesis that inhibition of gastric emptying is via an anticholinergic mechanism. The results also indicate that absorption is a prerequisite of activity in inhibiting gastric emptying and suggest that these compounds are not acting via a local mechanism.

7730 EFFECTS OF ANTACIDS ON GASTRIC EMPTYING. (Eng.) Hurwitz, A.; Robinson, R. G.; Vats, T. S.; Whittier, F. C.; Herrin, W. F. (Univ. Kansas Medical Center, 39th and Rainbow Streets, Kansas City, KS 66103). *Gastroenterology* 71(2):268-273; 1976.

The effect of antacids on gastric emptying was studied in male Sprague-Dawley rats and in eight children, and the characteristics of the antacids that determine their effect on this function were investigated. The rats were given three 0.5-ml doses of water, antacid (aluminum hydroxide gel), or solutions of sodium, magnesium, or aluminum chloride by gastric intubation at 1-hr intervals. Immediately after the third dose, the animals were given 0.5 ml of either polyethylene glycol 4000 (PEG) 4%, phenol red 0.5%, or water. Twenty minutes after the third dose of aluminum hydroxide gel, the volume of gastric contents was nearly 5 times greater than that of controls, whereas an antacid containing magnesium trisilicate in addition to aluminum hydroxide had no effect on gastric fluid retention in rat stomachs. When over 80% of the PEG had left the stomachs of controls, less than 40% of this marker had left the stomachs of animals given aluminum hydroxide gel, demonstrating that the increased fluid volume in the aluminum hydroxide-treated rats was due to delayed gastric emptying and not just to increased gastric secretion. The stomachs of the animals receiving aluminum hydroxide gel had a more than 20-fold greater concentration of aluminum than did those of either water or combination antacid-treated animals. When the pH, osmolality, aluminum concentration, and anion composition were carefully controlled, the delay in gastric emptying was found to depend only on the aluminum concentration, whereas magnesium did not affect the ability of aluminum to slow gastric emptying. By using ^{51}Cr-sodium chromate and a gamma camera technique, the half-emptying time in six human subjects with no gastrointestinal disease was shown to be prolonged from 13.1 min after water ingestion to 48.0 min after three hourly doses of aluminum hydroxide gel (4 ml/10 pounds, not exceeding 45 ml, for each interval). Conventional nonabsorbable markers, including phenol red, were found to be of limited use for studying gastrointestinal function in the presence of antacid gels, most of which absorb dyes. The results suggest that because aluminum hydroxide gel delays gastric emptying, it should not be used in patients with partial gastric outlet obstruction. However, a desirable property of aluminum hydroxide gel may be its protracted, although incomplete, neutralization of gastric content.

7731 EFFECTS OF NICOTINE ON REBOUND EXCITATION OF GUINEA-PIG SMALL INTESTINE. (Eng.) Wood, J. D.; Rose, B. A.; Jackson, M. H. (Univ. Kansas Medical Center, Kansas City, KN 66103). *J. Pharmacol. Exp. Ther.* 196(1):71-79; 1976.

Experiments were carried out in guinea pig small intestinal segments to confirm the presence of muscarinic receptors on intrinsic inhibitory intestinal neurons. The suggestion that potentiation of the poststimulus response by atropine results from the blockade of muscarinic receptors on intrinsic inhibitory neurons was also tested. Poststimulus rebound contractions and associated action potentials of the circular muscle layer occurred after termination of transmural electrical stimulation. Low concentrations of nicotine (1-5 x 10^{-6} g/ml) either abolished or greatly reduced the poststimulus response. The contractile force and time duration of the response were reduced, and the latency of the response was increased by low concentrations of nicotine. The depressant action of nicotine was reversed by an increase in concentration from 5 x 10^{-6} g/ml. The effects of low concentrations of nicotine were mimicked by 1,1-dimethyl-4-phenylpiperazinium iodide (1 x 10^{-6}, 5 x 10^{-6}, and 1 x 10^{-5} g/ml), and they were prevented by hexamethonium (1 x 10^{-4} g/ml), pentolinium (5 x 10^{-5} g/ml), gallamine (1 x 10^{-5}, 2.5 x 10^{-5}, 5 x 10^{-5}, and 7.5 x 10^{-5} g/ml), and large concentrations of atropine (1 x 10^{-5} g/ml atropine, 1 x 10^{-4} g/ml nicotine). Gallamine increased myogenic electrical and mechanical activity and potentiated the poststimulus rebound response. Pretreatment with guanethidine produced a small reduction in the inhibitory action of nicotine. Propranolol (5 x 10^{-7} to 5 x 10^{-6} g/ml) and phentolamine (5 x 10^{-7} to 1 x 10^{-5} g/ml) suppressed the poststimulus response, but the specificity of the action was questionable. The effects of nicotine may be mediated by excitation of the intrinsic inhibitory neurons.

7732 MECHANISMS OF THE CONTRACTING ACTION OF K, ACETYLCHOLINE AND Ba AND OF THE ANTISPASMODIC ACTION OF Cd AND Mn ON THE PYLORIC ANTRUM STRIP OF RAT STOMACH, PARTICULARLY IN RELATION TO Ca. (Jpn.) Shino, H. (Kobe Univ. Sch. Medicine, Ikuta-ku, Kobe 650, Japan). *Folia Pharmacol. Jpn.* 72(1): 95-104; 1976.

7733 MECHANISMS OF THE CONTRACTING ACTION OF K, ACETYLCHOLINE AND Ba ON THE ISOLATED RAT RECTUM, ESPECIALLY IN RELATION TO Ca. (Jpn.) Taniyama, K.; Araki, H.; Maeda, M.; Cheng, J.-T.; Matsumoto, H. (Kobe Univ. Sch. Medicine, Ikuta-ku, Kobe 650, Japan). *Folia Pharmacol. Jpn.* 72(1):105-111; 1976.

7734 ACTION OF 2,4-DINITROPHENOL ON SLOW ELECTRICAL GASTRODUODENAL ACTIVITY: STUDY IN THE ANESTHETIZED RAT. (Fre.) Morelle, O.; Medici, A.; Thouvenot, J. (Laboratoire de Biochimie, Faculte de Pharmacie, 2 bis, boulevard Tonnelle, 37032 Tours Cedex, France). *Therapie* 30(6):897-905; 1975.

See also, 7869, 7913.

SECRETION AND METABOLISM

7735 SIMULTANEOUS RADIOIMMUNOASSAY OF SECRETIN AND GASTRIN. (Eng.) Tai, H.-H.; Chey, W. Y. (Isaac Gordon Center Gastroenterology, Genesee Hosp., 224 Alexander St., Rochester, NY 14607). *Anal. Biochem.* 74(1):12-24; 1976.

Radioimmunoassay techniques for the measurement of secretin and gastrin have been modified by using highly specific antisera and labeled hormones of different isotopes (^{125}I-labeled secretin and ^{131}I-labeled gastrin) to allow simultaneous measurement of both hormones in the same plasma samples. Less than 0.01% cross reactivity was observed with either antibody against the other hormone. Preincubation of the antibodies for 24 hr with unlabeled hormones greatly increased the sensitivity of the assay. The plasma- and dextran-coated charcoal effectively separated the free from the bound form of both hormones. The presence of 150 mM sodium chloride, 100 mM urea, 10 mM creatinine, 10 mM glucose, and 25 U/ml heparin did not affect the separation procedure. Linearity of the assay was demonstrated, and the coefficients of variation were 6.1-7.4% for secretin and 3.7-4.3% for gastrin. The concentrations of the two hormones were determined in 44 fasting normal human subjects. The mean secretin concentration was 62.9 pg/ml (range, 19.5-139.7), while that for gastrin was 43.5 pg/ml (range, 22.3-109.1). Thus, simultaneous radioimmunoassay of secretin and gastrin may be performed without loss of sensitivity, specificity, and precision of the individual assays.

7736 THE INFLUENCE OF COFFEE AND CAFFEINE ON SERUM GASTRIN AND ACID SECRETION IN MAN. (Ger.) Borger, H. W.; Schafmayer, A.; Arnold, R.; Becker, H. D.; Creutzfeldt, W. (Klinik fur Allgemeinchirurgie der Universitat, 3400 Gottingen, Gosslerstr. 10, W. Germany). *Dtsch. Med. Wochenschr.* 101(12):455-457; 1976.

The effect of coffee, caffeine, and decaffeinated coffee on serum gastrin levels and acid secretion was determined in five healthy volunteers. Serum samples were drawn every 15 min for 3 hr after ingestion, and aspirated specimens of gastric juice were taken every 10 min for 1.5 hr following gavage of the test agents. Gastric acidity increased negligibly after caffeine, but increased significantly ($p<0.05$) after decaffeinated coffee and cofee during the first 90 min. At 90-150 min, the ncrease in acidity over a water standard was 1.9, .6, and 6.6 mmol/hr for caffeine, coffee, and lecaffeinated coffee, resp., all of which were significant ($p<0.05$). Serum gastrin rose from a basal 28 ng/l to 54 ng/l after coffee and from 27 g/l to 60 ng/l after decaffeinated coffee, both of which are significant ($p<0.05$). It is suggested that gastrin liberation might be attributable to ingredients unique to the coffee roasting process.

7737 EFFECT OF JEJUNAL RESECTION ON THE GASTRIC ACID SECRETORY RESPONSE TO PENTAGASTRIN, HISTAMINE AND FEEDING IN DOGS. (Eng.) Brihaye, C.; Noussen-Colle, M. C.; Limbosch, J. M.; de Graef, J. (Hopital Saint-Pierre, 322 rue Haute, B-1000 Brussels, Belgium). *Digestion* 14(2):153-162; 1976.

The effect of resection of the upper half of the small intestine on the acid secretory responses to a meal and to graded doses of histamine and pentagastrin was investigated in dogs with gastric fistulas and vagally denervated Heidenhain pouches of the oxyntic gland area. In the gastric fistula, no changes in the dose-response curves for histamine or pentagastrin were observed after resection of the upper small intestine. In the Heidenhain pouch, jejunectomy resulted in an increase of the responses to both histamine (20% increase) and pentagastrin (44% increase). The ED$_{50}$ values did not change significantly. After bowel resection, the Heidenhain pouch maximal acid response to feeding was increased by 68%, and the total response was increased by 92%. The secretory response was more prolonged after the operation. The data indicate that both an increase in stimulation and an increase of the response to this stimulation are responsible for the increased acid secretion observed in the pouch when resected dogs were fed. The effects could be explained by the withdrawal of inhibitors originating in the intestine.

7738 SERUM GASTRIN LEVEL IN EARLY CHILDHOOD. (Eng.) Sann, L.; Chayvialle, J. A. P.; Bremond, A.; Lambert, R. (INSERM U-45, Pavillon H vis, Hopital Edouard-Herriot, 69374 Lyon, France). *Arch. Dis. Child.* 50(10):782-785; 1975.

7739 ROLE OF PROXIMAL DUODENAL MUCOSA IN OVERALL PROVISIONS FOR ACID DISPOSAL IN THE UPPER GASTROINTESTINAL TRACT. (Eng.) Chung, R.; Johnson, G. M.; DenBesten, L. (Veterans Admin. Hosp., Iowa City, IA). *Surg. Forum* 26:389-390; 1975.

7740 GANGLIOSIDES OF THE HUMAN GASTROINTESTINAL MUCOSA. (Eng.) Keranen, A. (Dept. Medical Chemistry, Univ. Helsinki, Siltavuorenpenger 10 A, SF-00170 Helsinki 17, Finland). *Biochim. Biophys. Acta* 409(3):320-328; 1975.

7741 PATTERNS OF ANTRAL RELEASE AND RENAL CATABOLISM OF HETEROGENEOUS GASTRIN. (Eng.) Fender, H. R.; Ramus, N. I.; Rayford, P. L.; Curtis, P.; Thompson, J. C. (Dept. Surgery, Univ. Texas Medical Branch, Galveston, TX). *Surg. Forum* 26:353-355; 1975.

7742 THE ANTI-FOLATE EFFECT OF METHIONINE ON BONE MARROW OF NORMAL AND VITAMIN B$_{12}$ DEFICIENT RATS. (Eng.) Cheng, F. W.; Shane, B.; Stokstad, E. L. R. (Public Health Res. Inst. of the City of New York, Inc, 455 First Ave., New York, NY 10016). *Br. J. Haematol.* 31(3):323-336; 1975.

7743 THE COMPOSITION AND FLOW OF PAROTID SALIVA DURING ACUTE HYPERKALAEMIA IN SODIUM-DEFICIENT SHEEP. (Eng.) Beal, A. M.; Clark, R. C.; Budtz-Olsen, O. E. (Agricultural Res. Council, Inst. Animal Physiology, Babraham, Cambridge CB2 4AT England). *Q. J. Exp. Physiol.* 60(4):315-323; 1975.

7744 RADIOIMMUNOASSAY MEASUREMENT OF SEROTONIN RELEASE FOLLOWING DUODENAL ACIDIFICATION. (Eng.) Kellum, J. M., Jr.; Jaffe, B. M. (Washington Univ. Sch. Medicine, Washington, DC). *Surg. Forum* 26:386-387; 1975.

See also, 7973.

SECRETION AND METABOLISM

Stomach

7745 STUDIES ON THE MECHANISMS OF FOOD-STIMULATED GASTRIC ACID SECRETION IN NORMAL HUMAN SUBJECTS. (Eng.) Richardson, C. T.; Walsh, J. H.; Hicks, M. I.; Fordtran, J. S. (Univ. Texas Health Science Center, Dallas, TX 75235). *J. Clin. Invest.* 58(3):623-631; 1976.

Gastric acid secretion after infusion of a variety of liquid meals was studied in 19 normal adult subjects by intragastric titration at pH 5.0. Secretion after 500 or 750 ml of a 0.643% NaCl meal was 2-3 times higher than the basal secretion rate ($p<0.02$), and amounted to 25-30% of the peak secretory response to histamine (0.04 mg/kg). Neither of the NaCl meals caused an increase in the basal serum level of gastrin. A 500-ml glucose meal (14 g glucose + 120 g cornstarch) caused a similar increase in acid secretion and a small, but definite, increase in serum gastrin during the first 30 min after the meal. A 500-ml amino acid (casein hydrolysate) meal caused a greater acid secretory response than the other meals (50% of the peak histamine stimulation), as well as a greater gastrin response than the other meals. The NaCl and amino acids meals were almost completely emptied from the stomach by the end of the 2-hr observation period, but 16% of the polyethylene glycol in the glucose meal was still in the stomach after 2 hr, and the gastric volume was greater than with the other meals. The addition of fat (40 g Lipomul) to a glucose meal inhibited the acid secretory response in 2 hr from 15.6 to 12.0 mEq ($p<0.05$), but increased the integrated gastrin response from 0.51 to 2.18 ng/min/ml ($p<0.05$). Addition of 20 g of amino acids to the carbohydrate-fat meal increased acid secretion to 42% of the peak response to histamine, but 20 g of albumin did not further stimulate acid secretion. The addition of amino acids (20 g) to the carbohydrate-fat meal also increased the gastrin response significantly. There was a close correlation between the mean integrated gastrin response and the mean rate of acid secretion ($r=0.97$), but there was a poor correlation between acid secretion and serum gastrin concentration when the responses of the individual subjects with a given test meal were compared. It is concluded that distention is an important stimulant of the acid secretory response to a meal, and that this is not mediated by gastrin release. Since the acid secretion noted with amino acids cannot be explained by distention, it is likely that gastrin is not the only mediator of the chemical phase of acid secretion. The rise in serum gastrin after glucose was too small and too transient to enhance acid secretion. Fat probably releases unmeasured inhibitors that overwhelm the effect of gastrin on acid secretion.

7746 STUDIES ON THE ACID SECRETION THAT OCCURS DURING INJURY TO THE GASTRIC MUCOSA.

(Eng.) Thompson, M. R. (The Royal Infirmary, Oxford Road, Manchester, MI3 9WL, England). *Gastroenterology* 71 (2):286-290; 1976.

Gastric acid secretion was studied in pouches of the oxyntic glandular mucosa in dogs after irrigation of the pouches with 4 mM dithiothreitol (DTT) in acid solution to cause injury. Instillation of DTT resulted in a large efflux of sodium into the pouch, accompanied by a large increase in volume output, part of which was plasma. This was interpreted as indicating a marked increase in the permeability of the mucosa to sodium and plasma. In spite of this, there was a net addition of acid to the pouch, amounting to nearly 1,200 μEq/30 min. Atropine (0.1 mg/kg, i.v.), metiamide (2.9-11.6 mg/kg, i.v.), or prostaglandin E_2 (PGE_2, 0.015-0.06 μg/kg/min, i.v.) significantly reduced the net addition of H^+ to the pouch, probably by reducing acid secretion. Increased back-diffusion was considered unlikely to explain the reduction in increase in net H^+ concentration in the pouch. All three drugs also significantly reduced the volume and plasma output induced by DTT. In this respect, PGE_2 was the most effective, and atropine was the least effective. There was a linear correlation ($r=0.92$) between the plasma output and the net H^+ flux during the control, metiamide, and PGE_2 experiments. All three drugs also caused a significant reduction in sodium efflux, which had a linear correlation ($r=0.95$) with plasma output. It is suggested that the mechanisms of acid secretion and plasma shedding are closely related, and that the three drugs used may be useful in the management of protein-losing gastropathy in man.

7747 INTERACTION OF ^{3}H-LABELLED SYNTHETIC HUMAN GASTRIN WITH RAT GASTRIC PLASMA MEMBRANES. EVIDENCE FOR THE EXISTENCE OF BIOLOGICALLY REACTIVE GASTRIN RECEPTOR SITES.

(Eng.) Lewin, M.; Soumarmon, A.; Bali, J. P.; Bonfils, S.; Girma, J. P.; Morgat, J. L.; Fromageot, P. (Unite de Recherches de Gastroenterologie, INSERM U-10, Hopital Bichat, 75877 Paris, Cedex 18, France). *FEBS Lett.* 66(2): 168-172; 1976.

Preliminary results of the binding of ^{3}H-synthetic human gastrin I (^{3}H-GI) to the gastric plasma membranes (GPM) purified from the fundic mucosa of male Wistar rats are reported. The GPM was prepared by sucrose gradient centrifugation. The preparation was relatively free of mitochondria and rough reticulum, as demonstrated by the content of marker enzymes. Electron microscopy of the band (1.12-1.14 g/cm^3) revealed smooth surface vesicles with a mean diameter of 1 μm and additional unclosed membrane fragments. The time course of association of ^{3}H-GI and GPM was roughly exponential, and equilibrium was achieved within 8 min, at which time 1-5% of the total radioactivity was bound per milligram of protein. The association constant was 4.2 x 10^{-7} M/min. Binding was reversible upon dilution of the incubation medium, and the half-time for dissociation was 2 min. ^{3}H-GI and unlabeled synthetic human gastrin I competed for binding, and equilibrium values for a given concentration of ^{3}H-GI were proportional to membrane protein concentration. Scatchard plot analysis indicated $N=42 \times 10^{-14}$ mol/mg of membrane protein and $K=1.7 \times 10^{-8}$ M. The basal adenyl cyclase activity in the GPM was enriched twofold over the homogenate, and this activity was stimulated by the presence of 10^{-8} M ^{3}H-GI, suggesting the involvement of 3',5'-AMP in the regulation of gastric acid secretion in the rat.

7748 DEGRADATION OF GASTRIN BY GASTRIC MUCOSAL CELLS.

(Eng.) Del Mazo, J.; McGuigan, J. E. (Univ. Florida Coll. Medicine, Gainesville, FL 32610). *J. Lab. Clin. Med.* 88(2):292-300; 1976.

Studies relating to the binding of ^{125}I-labeled synthetic human gastrin I heptadecapeptide (gastrin) by guinea pig gastric mucosal cells are reported. The cell binding of gastrin was not significantly affected by the presence of either insulin or glucagon, but it was reduced in the presence of nonlabeled

astrin hexadecapeptide. Maximum specific binding
f gastrin occurred at pH 7.4 and at 4 C. The as-
ociation constant of the binding was calculated to
e 5.0 x 10^{-9} M. Damage to gastrin following incuba-
ion with gastric mucosa cells was determined by
pecific antibody binding and was found to be greatest
ith gastrin-mucosal cell incubations at pH 7.4 and
t pH 2.0, with reductions in antibody binding of
0 and 15.2%, resp. No damage was detected at pH
.0, and the presence of at least two gastrin-degrad-
ng enzyme systems is suggested. After incubation at
H 7.4 at 4 C for 30 min, the ability to bind to
resh mucosal cells during a second subsequent incu-
ation was lost. There was no change in the chro-
atographic characteristics of gastrin preincubated
ith mucosal cells, even though antibody binding was
artially lost and binding ability to fresh mucosal
ells was completely lost. The inclusion of trasylol
1,000 U/ml) did not alter the binding of gastrin to
ucosal cells.

749 THE EFFECT OF METIAMIDE ON ACID SECRETION
STIMULATED BY GASTRIN, ACETYLCHOLINE, AND
IBUTYRYL CYCLIC ADENOSINE 3',5'-MONOPHOSPHATE IN
HE ISOLATED WHOLE STOMACH OF THE RAT. (Eng.)
unce, K. T.; Parsons, M. E.; Rollings, N. A. (Res.
nst., Smith Kline & French Lab., Ltd., Welwyn
arden City, Hertfordshire, England). *Br. J. Phar-*
acol. 58(1):149-156; 1976.

he effect of metiamide on the stimulation of gastric
cid secretion by gastrin, acetylcholine, and di-
utyryl cyclic adenosine 3',5'-monophosphate (DBcAMP)
as investigated using an isolated stomach prepara-
ion for immature rats. The hydrogen ion concentra-
ion was measured continuously in the perfusate of
he stomach lumen. Dose-response curves were deter-
ined for all three stimulants. The threshold con-
entration for gastrin was 10^{-8} M, and the response
as linear over the range of 3 x 10^{-8} M to 3 x 10^{-7}
. Metiamide (10^{-5}-3 x 10^{-5} M) effectively inhibited
astrin-stimulated acid secretion. The threshold
oncentration for acetylcholine was 10^{-4} M, and the
esponse was linear over the range of 3 x 10^{-4} M to
0^{-3} M. Concentrations above 3 x 10^{-3} M diminished
he basal rate of acid secretion. The threshold
oncentration for DBcAMP was 5 x 10^{-6} M. The dose-
esponse curve was constructed over the range of 5
10^{-5} M and 1.5 x 10^{-4} M. Metiamide did not inhibit
he acid secretion stimulated by either acetylcholine
r DBcAMP. The rat isolated stomach preparation is
useful tool for the elucidation of the control of
astric function. The failure of metiamide to in-
ibit DBcAMP-stimulated acid secretion supports the
onclusion that cyclic AMP operates at a position
istal to histamine in the chain of events leading to
cid secretion.

750 A QUANTITATIVE STUDY OF METIAMIDE, A HIS-
TAMINE H_2-ANTAGONIST, ON THE ISOLATED WHOLE
AT STOMACH. (Eng.) Bunce, K. T.; Parsons, M. E.
Research Inst., Smith Kline and French Labs., Ltd.,
elwyn Garden City, Hertfordshire, England). *J. Phy-*
iol. (Lond.) 258(2):453-465; 1976.

he inhibition of acid secretion by metiamide was studied quantitatively in the isolated perfused whole rat stomach. Dose-response curves to histamine in the presence and absence of metiamide were constructed. The mean basal acid secretion before stimulation was 4.19 x 10^{-8} mol/min. Metiamide (3 x 10^{-6}, 10^{-5}, and 3 x 10^{-5} M) did not reduce this amount significantly. With histamine-stimulated (10^{-5}-10^{-4} M) acid secretion, however, all three doses of metiamide caused a parallel and significant displacement of the histamine dose-response curves, indicating competitive antagonism. Dose ratios were determined from the dose-response curves; a plot of $\log_{10}$(DR-1) against $\log_{10}$[metiamide] gave a pA_2 value for metiamide of 5.91. The isolated perfused rat stomach is concluded to be useful for the quantitative investigation of gastric secretion.

7751 DOSE-EFFECT RELATIONSHIPS FOR REPEATED INJECTIONS OF PENTAGASTRIN IN RAT STOMACH INNERVATED BY THE VAGUS NERVE IN PERFUSION TESTS. (Ger.) de Boer, A.; Hantschmann, N. (Chirurgische Universitatsklinik Kiel, BRD, 23 Kiel, Hospitalstrasse 40, W. Germany). *Z. Exp. Chir.* 8(6):343-349; 1975.

The dose-response relation of pentagastrin to gastric secretion before and after vagal section is analyzed. Male Wistar rats anesthetized by urethane i.p. or s.c. received two s.c. injections of pentagastrin (PG) at 150-min intervals in 5-, 10-, 15-, 20-, 25-, and 30-μg/100 g doses, and the total acid secretion was measured. The 5-μg dose elicited an increase in acid secretion from 2.6 to 9.8 μEq at 40 min postinjection, which normalized at 140 min. The second injection led to the same maximum after only 20-30 min. An identical pattern was followed for subsequent dose level after the first and second PG injections, resp.: at 10 μg, 12.9 μEq and 10.4 μEq; at 15 μg, 15.4 μEq and 16.2 μEq; at 20 μg, 17.9 μEq and 18.5 μEq; at 25 μg, 15.5 μEq and 13.7 μEq; and at 30 μg, 17.0 μEq and 16.18 μEq. Doses higher than 20 μg/100 g harvested proportionally less acid, suggesting an inhibitory mechanism released by elevated gastrin levels. This phenomenon occurs also after truncal vagotomy due to parasympathetic inhibition.

7752 EFFECTS OF SOMATOSTATIN ON GASTRIC SECRETION AND GASTRIN RELEASE IN MAN. (Eng.) Raptis, S.; Dollinger, H. C.; von Berger, L.; Schlegel, W.; Schroder, K. E.; Pfeiffer, E. F. (Dept. Internal Medicine, Univ. Ulm, Steinhovelstrasse 9, D-79, Ulm, W. Germany). *Digestion* 13(1/2):15-21; 1975.

The effects of somatostatin on gastric secretion and gastrin release in 41 healthy subjects without gastrointestinal symptoms were investigated to determine whether these effects represent a direct action on the gastric secretory cell or they are mediated by pituitary hormones. Synthetic somatostatin (growth hormone release-inhibiting factor, GIF) was used in cyclic (oxidized) and linear (reduced) forms. Cyclic GIF was administered by a 60-min i.v. infusion of 5 μg/min, preceded by an initial dose of 300 μg given i.v. within 30 sec. Linear GIF was given by s.c. injection of 2 mg into each arm. In 9/41 subjects, gastric juice was collected before and during a 150-min infusion of 1 μg/kg/hr synthetic human gastrin (SHG I 1-17). Cyclic GIF significantly inhibited basal gastrin secretion ($p<0.01$) as well as test meal-stimulated gastrin secretion ($p<0.01$), with immediate rebound when the infusion stopped. Similar responses were observed in a hypophysectomized patient, indicating that these effects are independent of suppression of growth hormone. The gastrin levels rose markedly following infusion with SHG I, with a simultaneous increase in gastric acid and pepsin secretion. Fifteen minutes after cyclic GIF infusion, however, there was a significant fall in volume, acid output, and pepsin secretion ($p<0.0125$), although the plasma gastrin concentration remained unchanged. The s.c. injection of linear GIF also caused a significant decrease in stimulated gastric secretion ($p<0.005$) for a period of 165 min. The results show that GIF is a potent inhibitor of gastric secretion and gastrin release.

7753 ANESTHESIA AND STIMULATED GASTRIC SECRETION.

(Eng.) Mason, G. R. (Univ. Maryland Sch. Medicine, 22 S. Greene St., Baltimore, MD 21201). *Chir. Gastroenterol.* 9(4):447-451; 1975.

The effects of various anesthetic agents on the stimulation of gastric acid secretion by insulin, histamine, or gastrin were investigated in mongrel dogs with gastric fistulas or Heidenhain pouches. Insulin alone (10 U, i.v.) caused a reduction of blood sugar to less than 50 mg/100 ml and, after an initial fall, an increase in gastric acid secretion that reached a maximum at 45 min. In anesthetized animals, the secretion of gastric acid fell to near zero within the first 15 min, then reached a peak much smaller than that of controls at 45 min. In three of five animals under halothane anesthesia, four of five under pentothal anesthesia, and all animals under chloralose anesthesia, the decrease in gastric acid secretion was significant. An s.c. injection of histamine phosphate (1 mg) to dogs with Heidenhain pouches resulted in increased gastric acid secretion, which peaked during the second 15-min collection period. Chloralose and pentothal anesthesia slightly, but not significantly, reduced the peak acid secretion, but halothane anesthesia significantly reduced the peak in two of four animals. None of the anesthetic agents reduced the gastric secretory response to gastrin, and both animals tested under chloralose anesthesia had significant increases in acid secretion. It is concluded that the inhibition of acid secretion stimulated by insulin represents an interference with vagal transmission, perhaps by membrane effects. The lack of interference with gastrin stimulation of acid secretion may imply a direct action of this agent on the parietal cell. The inhibition of histamine-stimulated secretion may support the concept that histamine, not acetylcholine, is liberated by vagal stimulation.

7754 NEURAL SYSTEMS RESPONSIBLE FOR THE GASTRIC SECRETION PROVOKED BY 2-DEOXY-D-GLUCOSE CYTOGLUCOPOENIA.

(Eng.) Kadekaro, M.; Timo-Iaria, C.; Valle, L. E. R. (Dept. Physiology and Pharmacology, Inst. Biomedical Sciences, Univ. Sao Paulo, Cx Postal 4365, Sao Paulo, SP, Brazil). *J. Physiol. (Lond.)* 252(3):565-584; 1975.

The central structures responsible for the gastrosecretory effect of cytoglucopenia caused by 2-deoxy-D-glucose (2-DG) were investigated in 105 cats prepared with chronic gastric fistulas and subjected to various experimental procedures. Bilateral electrolytic lesions of the caudalmost two-thirds of the globus pallidus almost suppressed the secretory response (volume, acid concentration, and acid output) to 2-DG (60 mg/kg, i.v.) and caused aphagia and adipsia. The secretory response was blocked ($p<0.01$), along with feeding behavior, after destruction of selected parts of the brainstem. Microinjection of 2-DG (200 μl, 40 mg/ml, over 15 min) in the medial forebrain bundle caused intense gastric secretion, but this procedure was ineffective when the caudalmost globus pallidus was stimulated. Increasing doses of 2-DG (100 or 200 mg/kg), systemically injected, restored the secretory response after intercollicular transection of the brain stem. Secretion of pepsin was only slightly increased, suggesting a differential control of water, acid, and pepsin secretion in response to cytoglucopenia. It is concluded that at least three reflex systems are involved: (1) a reflex consisting of afferent and efferent pathways in the medial forebrain bundle area, (2) a reflex whose afferent side is from the hypothalamus and efferent side is from the globus pallidus, and (3) a reflex whose afferent side probably originates in the liver and efferent side is in the lower brainstem. These three systems are possibly related to control of secretion and feeding behavior.

7755 EFFECT OF BILIARY FISTULA ON CANINE GASTRIC SECRETION.

(Eng.) Kihl, B. O.; Landor, J. H. (Dept. Surgery, CMDNJ-Rutgers Medical Sch., Piscataway, NJ 08854). *J. Surg. Res.* 19(4):245-249; 1975.

The effects of two types of biliary fistula on Heidenhain-pouch secretion were compared in mongrel dogs. For the chronic experiments, a Heidenhain pouch and a Thiry fistula were constructed in each of six dogs, who later underwent ligation and division of the distal common bile duct. Half were fitted with an external biliary fistula (EBF) and half with an ileal biliary fistula (IBF). After 3-4 weeks, the EBF was changed to an IBF and vice versa. For acute experiments, two dogs were prepared with a pouch, a total EBF, gastrostomy, and a Thiry-Vella loop of the ileum. In these dogs, gastric secretion was stimulated by the continuous infusion of pentagastrin peptide (0.75 μg/kg/hr). In the chronic experiments, during the period with the IBF, 24-hr HCl output was higher (19%-105%) in all dogs than it was during the control period ($p=0.0001$). Increases in secretion after IBF (but not EBF) were also significant ($p=0.036-0.0001$). Outputs from the Thiry fistulas were considerably less (33%-42%) with the IBF than with the EBF. In the acute experiments, HCl output during pentagastrin stimulation averaged 2.91 and 1.03 mEq in the two dogs. When bile was placed in the Thiry-Vella loop, the output dropped to 1.03

Eq (p=0.0001) and 0.75 mEq (p=0.0163), resp. hese results show that simple diversion of bile way from the gastrointestinal tract does not result n gastric hypersecretion. They support the contenion that it is the passage of bile through isolated mall intestine, rather than the loss of bile from he gut, that is the critical factor in increasing astric acid production after bile diversion.

756 DISTRIBUTION OF ADENYL CYCLASE SENSITIVE TO HISTAMINE IN RABBIT GASTRIC MUCOSA.

Eng.) Katsumata, Y.; Yagi, K. (Inst. Biochemistry, aculty of Medicine, Univ. Nagoya, Nagoya, Japan). *iochem. Pharmacol.* 25(5):603-604; 1976.

he histological distribution of adenyl cyclase acivity in rabbit gastric mucosa and the effects of ecretion-promoting agents were investigated. Seral tissue sections were incubated in a reaction ixture containing 50 mM Tris-HCl, 5 mM $MgCl_2$, 20 M creatine phosphate, creatine phosphokinase (100 /ml), 1 mM cAMP, and 1 mM ^{32}P-ATP (10-15 cpm/pmol) n the absence and presence of histamine phosphate, etragastrin, or sodium fluoride (NaF). Production f cAMP was linear both with time up to 10 min of ncubation and with protein concentration up to 00 µg/100 µl. Tetragastrin (0.1 mM) did not ncrease the enzyme activity, but histamine (1 mM) nd NaF (10 mM) increased it significantly ($p<0.001$), he latter by 14 times. Adenyl cyclase activity as low in the epithelial cell layer, high in the egion 0.4 mm from the surface (rich in mucous neck ells), low 0.5-0.7 mm from the surface (rich in arietal cells), and high 1.0 mm from the surface rich in chief cells). Histamine increased adenyl yclase activity markedly 0.5-0.7 mm from the surace, and NaF increased the activity in all regions. t is concluded that histamine-sensitive adenyl cycase is related to parietal cells and that histamine s the mediator for gastrin in stimulating gastric cid secretion.

757 OXYGENATION OF FROG GASTRIC MUCOSA IN VITRO.

(Eng.) Kidder, G. W., III; Montgomery, C. . (Univ. Maryland Sch. Dentistry, Baltimore, MD 1201). *Am. J. Physiol.* 229(6):1510-1513; 1975.

It has been shown that 5% CO_2/95% O_2 in the serosal bathing solution with 100% O_2 in the mucosal solution results in CO_2-diffusion limitation of acid secretion in bullfrog gastric mucosa; changing to 10% CO_2/90% O_2 on both surfaces doubles the acid secretory rate. The hypothesis that a significant increase in the rate of oxygen consumption as a result of secretory stimulation would result in the tissue being oxygen-limited was tested. The oxygen tension (pO_2) was raised by increasing the total pressure in a hyperbaric chamber. No change in acid secretory rate or potential difference was observed when the pO_2 was increased from 0.9 to 1.9 atmospheres, indicating that the tissue is not O_2-limited at normal pressure. When the pO_2 was decreased below 0.9 atmospheres, the acid secretory rate was decreased, and both the potential difference and the resistance were increased. The authors conclude that the rate of oxygen consumption did not rise significantly when acid secretion was increased by supplying sufficient CO_2.

7758 MEASUREMENTS OF OXYGEN TENSION FROM THE CANINE GASTRIC MUCOSA UNDER THE INFLUENCE OF VASOACTIVE AND ACID STIMULATING AGENTS AND FOLLOWING VAGOTOMY. IMPLICATIONS ON THE PATHOPHYSIOLOGY OF PEPTIC ULCERATION.

(Eng.) Linder, M. M.; Alken, P.; Muschaweck, R.; Hartel, W. (Chirurgische Klinik des Klinikum Mannheim der Universitat Heidelberg, 6800 Mannheim, Postfach 23, W. Germany). *Z. Exp. Chir.* 9(4):239-245; 1976.

The effect of pharmacologic agents and of vagotomy on the course of mucosal oxygen tension (pO_2) was studied in dogs, and an attempt was made to correlate mucosal pO_2 with gastric pathophysiology. The pO_2 was measured using a multi-wire platinum electrode. The i.v. injection of norepinephrine (2.5 µg/kg) decreased the mean oxygen pressure to 50.8% of the control value (20.4 mm Hg). The minimum value was reached within 38.4 sec, and the pO_2 returned to normal within 106 sec of the injection. A higher dose of norepinephrine (5.0 µg/kg) decreased the pO_2 to 41.3%. The i.v. injection of nafronyl (2.5 mg/kg) increased the mucosal pO_2 to 257% of the control level within 77 sec. The mean arterial blood pressure dropped from 135 to 86 mm Hg within 29 sec and returned to normal within 4 min. The i.v. injection of pentagastrin (0.5-5.0 µg/kg) increased the pO_2 to 174.2% within 116 sec. The mean arterial blood pressure dropped from 136 to 102 mmHg within 39 sec and returned to normal after 5 min. Subdiaphragmatic total vagotomy diminished gastric mucosal pO_2 in six dogs to a mean of 33% of normal within 194 sec. The mean arterial blood pressure remained unchanged. The fall in pO_2 might explain poor results of therapeutic vagotomy in stress ulceration.

7759 THE PEPSINOGENS OF CAT GASTRIC MUCOSA AND THE PEPSINS DERIVED FROM THEM.

(Eng.) Shaw, B.; Wright, C. L. (Medical Sch., The Univ., Newcastle upon Tyne, NE1 7RU, England). *Digestion* 14(2):142-152; 1976.

Fundic mucosal extracts of the cat were examined by chromatography to investigate the pepsinogens and the pepsins derived from them. The peaks of proteolytic activity located by DEAE-cellulose chromatography at pH 5.3 were shown to be heterogeneous on electrophoresis. By electrophoresis of individual homogenous chromatographic fractions, nine separate zones of proteolytic activity were detected. One zone did not migrate from the origin and was possibly a nonpepsinogen gastric protease. Simultaneous electrophoresis of pepsinogens and pepsins indicated that each pepsinogen gave rise to one pepsin. One zymogen gave rise to a pepsin active with the synthetic substrate acetyl-*L*-phenylalanyl-*L*-diiodotyrosine. The proteolytic activity of this enzyme was very low and was most apparent in the pH range 3.1-3.7.

7760 INHIBITORY EFFECT OF GASTRIC AUTO-ANTIBODIES ON THE PROLIFERATION KINETICS OF PARIETAL AND PEPTIC CELLS [Abstract]. (Eng.) Glass, G. B. J.; Lopes, J. D.; Ito, H. (N.Y. Medical Coll., New York, NY). *Clin. Res.* 24(3):477A; 1975.

7761 GASTRIC AND SALIVARY SECRETION OF d,l-METHADONE (M) IN MAN [Abstract]. (Eng.) Olsen, G. D.; Leger, R. M.; Gerber, N.; Lynn, R. K. (Univ. Oregon Health Sciences Center, Portland, OR 97201). *Fed. Proc.* 35(3):539; 1976.

7762 A FRACTION ISOLATED FROM PORCINE UPPER SMALL INTESTINE STIMULATING PEPSIN SECRETION IN THE CAT. (Eng.) Vagne, M.; Mutt, V.; Perret, G.; Lemaitre, R. (Inserm U-45, Hopital E. Herriot, Pavilion Hbis, F-69374 Lyon, Cedex 2, France). *Digestion* 14(1):89-93; 1976.

7763 ROLE OF HISTIDINE-DECARBOXYLASE INHIBITORS ON GASTRIC ACID SECRETION IN THE RAT. (Eng.) Castellucci, A.; Megazzini, P. (Istituto Farmacobiologico Malesci, s. a. s., via Paisiello 8, I-50100 Firenze, Italy). *Arzneim. Forsch.* 26(1): 62-65; 1976.

7764 EFFECT OF HALOTHANE ON GASTRIC ACID SECRETION AND CYCLIC AMP CONTENT IN THE RAT [Abstract]. (Eng.) Geumei, A.; Danhof, I. E. (Southwestern Medical Sch., Univ. Texas Health Sciences Center, Dallas, TX 75222). *Fed. Proc.* 35(3):539; 1976.

7765 FELINE GASTRIC CYCLIC NUCLEOTIDE LEVELS FOLLOWING STIMULATION WITH HISTAMINE (H), PENTAGASTRIN (P), BETHANECHOL (B), OR THEOPHYLLINE (T) [Abstract]. (Eng.) Bower, R. H. (Naval Regional Medical Center, San Diego, CA). *Clin. Res.* 24 (3):281A; 1976.

7766 EFFECT OF FEMALE SEX HORMONES AND ADRENOCORTICOTROPHIN ON FELINE GASTRIN AND GASTRIC SECRETIONS. (Eng.) Albinus, M.; Blair, E. L.; Hirst, F.; Grund, E. R.; Reed, J. D. Sanders, D. J.; Taylor, W. (Medical Sch., Newcastle upon Tyne, NE1 7RU England). *J. Endocrinol.* 69(3):449-450; 1976.

7767 GASTRIC ACID SECRETORY RESPONSES OF ACUTE GASTRIC FISTULA PREPARATION IN ANESTHETIZED YOUNG CHICKENS. (Eng.) Goto, Y.; Watanabe, K. (Dept. Pharmacometrics, Toyama Univ., Toyama 930, Japan). *Experientia* 32(7):946-948; 1976.

7768 BETA-ADRENERGIC MECHANISMS AND ULCER FORMATION IN PYLORUS-LIGATED RATS. (Eng.) Christensen, K. C.; Stadil, F.; Hermansen, K. (Rigshospitalet, Blegdamsvej 9, 2100 Copenhagen, Denmark). *Scand. J. Gastroenterol.* 10(7):715-720; 1975.

7769 THE EFFECT OF VAGOTOMY ON THE ENTEROGASTRONE MECHANISM [Abstract]. (Eng.) Kaminski, D. L. (Dept. Surgery, Saint Louis Univ., Saint Louis, MO). *Clin. Res.* 24(3):478A; 1976.

See also, 7732, 7736, 7888, 7889, 7912, 7930, 7939, 7991, 8033, 8045, 8046, 8047, 8051.

SECRETION AND METABOLISM

Pancreas

7770 A DEMONSTRATION THAT THE RATIOS BETWEEN HUMAN PANCREATIC ENZYMES CAN CHANGE IN 4 DAYS. (Eng.) Allan, B. J.; White, T. T. (Univ. Washington Sch. Medicine, Seattle, WA 98195). *Digestion* 14(3):232-241; 1976.

Pancreatic juice was collected from six patients without known pancreatic disease during the first 6 days after sphincteroplasty. Until the 4th day, patients were on nasogastric suction and were intravenously fed; beginning on the 4th day, they were fed orally. During the first 3 days, flow rates were very low (0.03 ml/min), but on days 4-6 the flow rate was more rapid (0.40 ml/min). Protein concentrations in the two periods were inversely related to flow rates (30-40 mg/ml/8 hr in period I, 2-4 mg/ml/hr in period II). Cellulose acetate electrophoresis of inactive 8-hr collections of pancreatic juice from one patient revealed several differences throughout the observation period. Changes in protein patterns were most marked in the early postoperative period, whereas the patterns on days 4-6 were relatively similar. The band containing amylase was darker on the 1st than the 4th day, while trypsinogen 2 was more prominent on the 4th than on the 1st day. In four of the other five patients, similar patterns were observed for the first 3 postoperative days. Major peaks on the 1st day included amylase, lipase, proelastase, chymotrypsinogen, trypsinogen 1, and unidentified enzymes, and the minor peaks included procarboxypeptidase A, trypsinogen 2, and other unknown bands. The patterns on days 4-6 were more variable.

psinogen 2 was present in much greater amounts
n on the 1st day, and this was confirmed histo-
mically. Histochemical analysis revealed no active
psin or chymotrypsin after electrophoresis. The
erimental variations were not caused by early acti-
ion of the proteases or by the presence of blood
ments. The changes in the trypsinogen 2 and amy-
e content may enable the evaluation of the influ-
e of pancreatic disease on the composition of
creatic secretion.

'1 EXOCRINE PANCREATIC FUNCTION AND CALCIUM
BALANCE. EXPERIMENTAL STUDIES OF THE EF-
T OF PARATHYROID HORMONE, VITAMIN D_3, 25-HYDROXY-
LECALCIFEROL, DIHYDROTACHYSTEROL AND THYROCALCI-
IN. (Ger.) Heidbreder, E.; Sieber, P.; Heidland,
(Med. Univ.-Klinik, Nephrologische Abteilung, D-
0 Wurzburg, Josef-Schneider-Strasse 2, W. Germany).
. *Exp. Med. (Berl.)* 166(2):147-163; 1975.

relation of calcium homeostasis and its deter-
nants to exocrine pancreatic function was genera-
ed in experiments on perfused cat pancreas. Ele-
ion of calcium ions in the perfusate elicited in-
eased protein and enzyme release; a continuous cal-
m supply failed to raise pancreatic calcium sec-
ion, except transiently. Extracellular calcium
a direct, temporary acinar effect. Vitamin D_3,
hydroxycholecalciferol (HCF), and dihydrotachy-
erol had no effect on pancreatic secretion dynamics.
flow rate remained constant, and calcium excre-
n was unchanged. Acetylcholine (ACTH) or chole-
tokinin (CK)-pancreozymin (PM) stimulation of pro-
n or enzyme was increased after HCF challenge.
hough vitamin D_3 altered intestinal calcium trans-
t, it had no gastric or pancreatotropic effect.
g-term parathyroid hormone affected neither the
w rate nor electrolyte liberation, but inhibited
tein excretion after CK-PM or ACTH stimulation;
protein suppression was potentiated by simulta-
usly increasing the extracellular calcium concen-
tion. The addition of vitamin D_3 or HCF neutral-
ed the protein-damping effect of parathyroid hor-
e, as the pancreas is not a target tissue of it.
rocalcitonin also depressed CK-PM- or ACTH-stimu-
ed protein, if the extracellular calcium remained
stant; it had no effect on the flow rate or cal-
m secretion. Whether the reduced protein and
zyme pattern is the initial pathogenetic phase of
creatic dysfunction and can serve as a model of
ercalcemic pancreatitis remains controversial.

'2 REGULATION OF PANCREATIC AND GALLBLADDER
FUNCTIONS BY INTRALUMINAL FATTY ACIDS AND
E ACIDS IN MAN. (Eng.) Malagelada, J.-R.; Di-
gno, E. P.; Summerskill, W. H. J.; Go, V. L. W.
astroenterology Unit, Mayo Clinic and Mayo Found-
ion, Rochester, MN 55901). *J. Clin. Invest.* 58
):493-499; 1976.

effects of intraduodenal glycerol, fatty acids
) chain length and FA loads, and bile acid (BA)
ncentrations on pancreatic and gallbladder func-
n were investigated in 31 healthy volunteers by
perfusion method. The FA absorption rates in the
duodenum and proximal jejunum were measured simultaneously. All individuals received two different test solutions during separate 100-min perfusions. The test solutions all contained the bile acid sodium taurocholate (10 mM) plus oleic (C18), lauric (C12), or octanoic acid (C8). Pancreatic enzyme outputs evoked by all three FA at 20 mM were above basal values ($p<0.05$). C18 was more potent than C12 and both were more potent than C8 ($p<0.01$). Bilirubin outputs were greater than control values with C18 and C12 ($p<0.01$) but not with C8. (The responses increased with increasing chain length). C18 at 20 or 30 mM (but not 10 mM) caused a striking elevation in bilirubin output ($p<0.01$). Increasing the BA concentration from 1 to 10 mM decreased the pancreatic enzyme outputs otherwise stimulated by C18 ($p<0.02$) and decreased the enzyme response to C8 ($p<0.05$). At 20 mM, outputs in response to C18 increased to values obtained at 1 mM BA. High bilirubin outputs were obtained with C18 ($p<0.01$) or C8 ($p<0.05$) perfused with 1 mM BA. Outputs declined to basal levels with 10 mM BA but increased again with 20 mM BA. BA concentration of 1-10 mM accelerated FA absorption but decreased the magnitude of pancreatic and gallbladder responses to FA. BA concentrations of 10-20 mM had the opposite effect. A significant, inverse correlation was found between FA absorption and pancreatic and gallbladder responses to FA, suggesting a relation between the length of the intestine exposed to FA and the amount of cholecystokinin, which stimulates pancreatic secretion and gallbladder contraction, released.

7773 EXOCRINE PANCREATIC FUNCTION IN MAN AFTER TREATMENT WITH OXYTETRACYCLINE AND CHLORAMPHENICOL. (Eng.) Fleischer, K. (Medizinische Klinik des Universitat Wurzburg, Luitpoldkrankenhaus, D-87 Wurzburg, W. Germany). *Digestion* 14(2): 108-116; 1976.

Pancreatic exocrine function was evaluated by a secretin-cholecystokinin test before and after treatment with oxytetracycline (OTC, 250 or 500 mg, twice daily, x 3 or 6 days) or chloramphenicol (CAP, 1 g, three times daily, x 3 or 6 days). OTC was administered to 14 men, either healthy or with chronic pancreatitis, and CAP was given to 7 similar men.
The control group consisted of 22 healthy adult men. At the lower dose, OTC did not affect the volume of secretion, maximum bicarbonate concentration, or sodium secretion. At 500 mg, OTC resulted in a fall in volume in four of six subjects, while the maximum bicarbonate output increased in three and decreased in three others. Sodium secretion followed the volume of secretion, but calcium secretion showed a nearly uniform decline after both doses. Trypsin and chymotrypsin outputs after 250 mg OTC were essentially unchanged, while after 500 mg, there was a slight decrease in chymotrypsin. Amylase activity was distinctly reduced in all but two subjects after either dose, and lipase was reduced in the majority of cases. After CAP, the volume, sodium, and maximum bicarbonate concentration were unaffected. Calcium levels declined in five subjects, were unchanged in one, and increased in one. Outputs of trypsin, chymotrypsin,

and lipase did not show any uniform pattern, but amylase activity decreased distinctly in four subjects, was unchanged in two, and increased in one. The patterns after 6 days of either drug were not different from those after 3 days. There were no significant changes in the individual parameters when patients with pre-existing pancreatic insufficiency were compared with normal subjects. Following 250 mg of OTC, serum levels at 6 and 12 hr after injection averaged 4 and 2.27 μg/ml, resp. Corresponding values after 500 mg OTC were 6.4 and 4.65 μg/ml. At 8 hr after administration of CAP, serum levels averaged 13.4 μg/ml. The effects on enzyme production are considered to reflect the onset of pancreatic dysfunction due to antibiotic administration, resulting in inhibition of protein synthesis.

7774 CONTINUOUS SECRETIN INFUSION WITH PANCREOZYMIN PRETREATMENT AS A PANCREATIC FUNCTION TEST. (Eng.) Takebe, T.; Koizumi, H.; Yamagata, S. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 118(Suppl.):173-181; 1976.

The results of a pancreatic function test with a submaximal dose of secretin given by continuous infusion after the injection of submaximal doses of cholecystokinin-pancreozymin (CCK-PZ) are described. Twenty healthy male students were given 1 U/kg of CCK-PZ by constant infusion over a 5-min period, followed by a continuous i.v. infusion of secretin (1.2 Crick-Harper-Raper U/kg/hr) over a 90-min period. Continuous suction aspiration of duodenal contents was performed during nine consecutive 10-min collection periods. The highest volume of output was in the first fraction, after which the volume leveled off at approximately 30 ml per fraction, with a slight increase in the ninth fraction. The icterus index was highest in the initial fraction and then rapidly decreased in the next two fractions. The icterus index was essentially constant in the fourth through sixth fractions and showed a slight increase in the seventh to ninth fractions. This suggested that the first three fractions were biliary, and the subsequent fractions were pancreatic. The bicarbonate concentration increased gradually and became constant at 110-115 mEq/l after the fifth fraction. The bicarbonate output was less in the second fraction than in the first, then gradually increased and became constant in the fifth through the ninth fractions. The highest amylase concentration and output were found in the initial fraction, after which both parameters were essentially constant until the eighth fraction, in which both were again slightly increased. The coefficients of variation in the volume output and the bicarbonate concentration were calculated to be about 15 and 5%, resp. These variations were considerably smaller than those encountered in the standard secretin test, because of the elimination of bile contamination. It is suggested that if a pure and well standardized secretin preparation is available, this test may become a useful tool for the early diagnosis of pancreatic disease.

7775 MOLECULAR PROPERTIES AND MECHANISM OF ACTIVATION OF THE TWO HUMAN TRYPSINOGENS [Abstract]. (Eng.) Guy, O.; Bartelt, D. C.; Colomb, E.; Figarella, C. (INSERM U-31, 46, chemin de la Gaye, F-13009 Marseille, France). *Digestion* 13(3):171-172; 1975.

7776 INHIBITION OF SECRETORY PROCESS IN RAT EXOCRINE PANCREAS BY MICROTUBULE INHIBITORS [Abstract]. (Eng.) Seybold, J.; Bieger, W.; Kern, H. F. (Dept. Anatomy, Univ. Heidelberg, Heidelberg, W. Germany). *Biol. Gastroenterol. (Paris)* 9(1):79; 1976.

7777 IN VITRO SECRETION OF GASTRIN BY LONG-TERM CULTURES OF HUMAN PANCREAS [Abstract]. (Eng.) Hollande, E.; Giron, B. J.; Lehy, T.; Accary, J. P.; Roze, C. (INSERM U-83, Hopital Herold, Paris, France). *Digestion* 13(3):172; 1975.

7778 EVIDENCE OF A DISSOCIATION IN PANCREATIC SECRETION WHEN CATECHOLAMINES STORAGE IS DEPLETED [Abstract]. (Eng.) Voirol, M.; Tiscornia, O.-M.; Levesque, D.; Bretholz, A.; Dzieniszewski, J.; Palasciano, G.; Laugier, R.; Sarles, H. (INSERM U-31, 46, Chemin de la Gaye, F 13009 Marseille, France). *Biol. Gastroenterol. (Paris).* 9(1):73; 1976.

7779 BICARBONATE AND CYCLIC AMP SECRETION IN PURE PANCREATIC JUICE; DOSE-RESPONSE CURVES TO SYNTHETIC SECRETIN IN MAN [Abstract]. (Eng.) Domschke, S.; Domschke, W.; Rosch, W.; Konturek, S. J.; Wunsch, E.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nuremberg, D-852 Erlangen, W. Germany). *Biol. Gastroenterol. (Paris)* 9(1):64-65; 1976.

7780 INTERACTION OF GASTROINTESTINAL HORMONES ON THE RAT EXOCRINE PANCREAS. INFLUENCE OF INOPHORE A-23187 [Abstract]. (Eng.) Robberecht, P.; De Neff, P.; Christophe, J. (Laboratoire de chimie biologique et de la nutrition, Universite Libre de Bruxelles, Belgium). *Digestion* 13(3):184; 1975.

7781 NON-PARALLELISM IN THE SYNTHESIS AND SECRETION OF PANCREATIC AMYLASE AND CHYMOTRYPSINOGEN FOLLOWING HORMONAL STIMULATION (CCK-PZ + SECRETIN) [Abstract]. (Eng.) Dagorn, J. C. (G.I. Res. Unit, Sherbrooke Univ., Sherbrooke, Quebek JIK 2RI, Canada). *Biol. Gastroenterol. (Paris)* 9(1):72-73; 1976.

7782 SECRETION OF FLUID AND AMYLASE BY THE PERFUSED RAT PANCREAS [Abstract]. (Eng.) Ueda, N. (Dept. Physiology, Univ. Dundee, DDT 4HN, Dundee, Scotland). *Biol. Gastroenterel. (Paris).* 9(1):70; 1976.

7783 EFFECTS OF CHRONIC METHADONE ADMINISTRATION ON BASAL AND 2-DEOXYGLUCOSE-STIMULATED PANCREATIC SECRETION IN THE RAT [Abstract]. (Eng.) Roze, C.; Vaille, C.; de la Tour, J.; Souchard, M.; Chariot, J.; Debray, C. (Hopital Bichat, 170 Boulevard Ney, F-75018 Paris, France). *Digestion* 13(3):184-185; 1975.

See also, 7690, 7696, 7818.

SECRETION AND METABOLISM

Hepatobiliary Tract

7784 COVALENT BINDING: USEFUL INDEX OF THE FORMATION OF CHEMICALLY REACTIVE DRUG METABOLITES. (Eng.) Mitchell, J. R. (Lab. Chemical Pharmacology, Natl. Heart and Lung Inst., NIH, Bethesda, MD 20014). *Biochem. Soc. Trans.* 3(5):622-626; 1975.

The role of covalent binding in drug-protein interactions is reviewed, and its use as an index of the formation of chemically reactive drug metabolites is proposed. These metabolites have been implicated as mediators of the hepatic necrosis produced in animals by several common hepatotoxic drugs, such as acetaminophen (4'-hydroxyacetanilide; paracetamol). At therapeutic doses, this analgesic is rather safe. But at large doses, it can produce fatal centrilobular liver necrosis in man and experimental animals. In mice, little covalent binding occurred until the dose reached the toxic value (>300 mg/kg). The glutathione concentration in the liver decreased as the dose of the drug was increased, suggesting that glutathione inactivated a chemically reactive metabolite and, thereby, prevented covalent binding and necrosis. Since acetaminophen is chemically stable, the finding of a covalent linkage with macromolecules of the liver demonstrates that it was converted in the body into reactive alkylating, arylating, or acylating agents. Pretreatment of mice with inducers of metabolism, such as phenobarbital, or with inhibitors of metabolism, such as piperonyl butoxide and $CoCl_2$, similarly altered the drug metabolism rate, the severity of necrosis, and the extent of hepatic binding of radiolabeled metabolites.

7785 TWO-COMPARTMENT MODEL FOR HEPATIC DYE EXCRETION DURING INTRAVENOUS INFUSION. (Ger.) Towe, J.; Brugmann, E. (Bereiches Medizin, Universitat Rostock, 25 Rostock, Leninallee 70, E. Germany). *Wiss. Z. Univ. Rostock* [*Math.-Naturwiss. Reihe*] 23(4/5):359-362; 1974.

The principle of constant infusion is interpreted on the basis of Richards' linear two-compartment model and applied to dye excretion in the liver. The blood, the biliary-intestinal system, and the liver are construed as homogeneous pools, whose sizes depend only on the amount of dye in each. The temporal change of dye in a pool simply depends on the difference between inflow and outflow per unit of time; and the flow from a pool is proportional to available dye. Conventional differential equations describing the time change in the amount of dye in the blood and liver can be used to find the various transport values between compartments, which describes the status of the liver. A saturation of dye concentration is rapidly reached in normal patients. In liver cirrhosis, the saturation is never reached; in the example provided, saturation was not reached by a constant 1-hr infusion. The dye concentration in the blood compartment is maximal in this case, since dye transport from blood to the liver is delayed in cirrhosis patients.

7786 BILIARY EXCRETION OF DYE IN DOGS INFUSED WITH BSP OR ITS GLUTATHIONE CONJUGATE. (Eng.) Barnhart, J. L.; Combes, B. (Univ. Texas Southwestern Medical Sch., Dallas, TX 75235). *Am. J. Physiol.* 231(2):399-407; 1976.

To determine whether conjugation of BSP facilitates dye excretion in the dog as it does in other species, the maximal rates of biliary excretion (Tm) of dye in dogs infused with either BSP or its glutathione conjugate (BSP-GSH) were compared. The mean Tm when BSP-GSH (14.4 μmol/ml, 0.9 ml/min) was infused was much higher (0.325 μmol/min/kg) than when BSP (8.0 μmol/ml) was infused (0.161 μmol/min/kg). The higher values for Tm during BSP-GSH infusion were accounted for entirely by a higher concentration of dye in bile (mean 29.0 μmol/ml versus 15.8 μmol/ml). When BSP and BSP-GSH were infused together, unconjugated BSP was soon detected in the bile. The rate of excretion of conjugated BSP into bile fell simultaneously and to a greater extent than the rate of appearance of unconjugated dye in the bile. As a result, total dye excretion fell. These results suggest that BSP and its conjugated metabolites compete for a common transport carrier and that BSP disproportionately depresses the biliary excretion of conjugated dye compounds; the latter observation accounts for the depressed dye Tm found during BSP infusion. Dye Tm was established during the simultaneous infusion of sodium taurocholate (0.77-2.71 μmol/min/kg) and either BSP-GSH or BSP. During the choleresis induced by increased bile salt excretion, dye excretion invariably rose. The slopes of the relation of dye excretion and bile salt excretion were comparable when either BSP or BSP-GSH were infused, although the absolute values for dye excretion at any value of bile salt excretion were higher during BSP-GSH infusion. Since increments of canalicular bile flow induced by the administration of theophylline (21 mg/kg, i.v.) or glucagon (5 μg/min) did not enhance dye excretion into bile, the enhancement of dye Tm during BSP-GSH infusion appears to be related to taurocholate excretion *per se*, rather than to the enhanced canalicular bile flow that accompanies its excretion. Furthermore, data on hepatic dye content and composition indicate that enhanced dye excretion with taurocholate is not accounted for by an alteration in dye composition in the liver. Rather, the two forms of dye are transported more readily into bile.

7787 THE ROLE OF GLUTATHIONE IN CHLOROFORM-INDUCED HEPATOTOXICITY.

(Eng.) Docks, E. L.; Krishna, G. (Lab. Clinical Pharmacology, National Heart and Lung Inst., NIH, Bethesda, MD 20014). *Exp. Mol. Pathol.* 24(1):13-22; 1976.

The role of glutathione (GSH) in chloroform-induced liver cell necrosis was investigated in male Sprague-Dawley rats. Rats were pretreated with phenobarbital (80 mg/kg, i.p.), 3-methylcholanthrene (20 mg/kg, i.p.), acetone (2.5 ml/kg, p.o.), or isopropanol (2.5 ml/kg, p.o.) prior to injection of ($CHCl_3$) chloroform. In phenobarbital-pretreated rats, $CHCl_3$ (0.2 ml/kg, i.p.) decreased liver GSH (to 6.02 μmol/g from a control value of 9.04; $p<0.001$) and caused massive liver necrosis. Only those doses of $CHCl_3$ that decreased GSH in the liver caused centrilobular liver necrosis. Other halogenated alkanes studied, including CCl_4 and CCl_3Br, did not deplete GSH in phenobarbital-pretreated rats. In rats pretreated with 3-methylcholanthrene, isopropanol, or acetone, which also increase drug metabolism, $CHCl_3$ (0.5 to 1.0 ml/kg) did not markedly decrease GSH in the liver. The GSH depletion was not due to oxidation of GSH or to inhibition of GSH reductase, because $CHCl_3$ did not increase the amount of oxidized GSH in liver, whole blood, or kidney. Since only liver GSH was depleted, it appeared that the depletion was related to $CHCl_3$ metabolism. Since CCl_4 and CCl_3Br are postulated to form the trichloromethyl free radical (CCl_3) and since these compounds do not deplete liver GSH in phenobarbital-pretreated rats, GSH depletion by $CHCl_3$ may be due to formation of chemically reactive metabolites other than this radical.

7788 HEPATIC UPTAKE OF ASIALOGLYCOPROTEINS IN VIVO: QUANTIFICATION USING A DUAL-ISOTOPE TECHNIQUE.

(Eng.) Regoeczi, E. (Dept. Pathology, McMaster Univ., 1200 Main St. West, Hamilton, Ontario, Canada, L8S 4J9). *J. Nucl. Biol. Med.* 19(3):149-154; 1975.

A method for the short-term measurement of the hepatic clearance of asialoglycoproteins in rats was developed. The rate of clearance is determined from the quantity of radioactive test protein that has accumulated in the liver during an interval that is shorter than the time required for the complete elimination of the dose from the plasma. This is made possible by the introduction of a separate marker for trapped hepatic plasma. Human serum albumin, human transferrin, and human and rat α_1-acid glycoproteins (AGP) were examined for their potential value as trapped plasma markers. The human serum albumin was found to be the best plasma marker because it was free of denatured material. Human AGP consistently gave higher estimates for trapped plasma volume in the liver than human serum albumin, because it was taken up to some extent by the rat liver. If rats were preinjected with an excess (2.3-3 mg/100 g) of unlabeled human or chicken AGP, the volume indicated by human AGP (labeled with ^{125}I or ^{131}I) appeared to be correct. Preloading of rats with rat AGP had no similar correcting effect on human I-AGP as a marker. Using I-labeled human serum albumin as a marker, the radioactivity representing trapped plasma in the liver corresponded, on the average, to 7.7% of the dose, and it was never less than 5%. Lower values can be taken as a sign for mixed intra- and paravenous injection. The need for a method for the short-term measurement of the hepatic clearance of asialoglycoproteins is twofold. In view of its rapid elimination, asialo-orosomucoid cannot be accommodated in a clearance system that runs longer; and previous experiments have indicated that hydrolysis of the endocytized asialoglycoprotein gives rise to losses of radioactivity from the liver as early as 20-30 min after injection.

7789 INVESTIGATIONS ON THE EXTENT OF LIVER LESIONS IN RATS BY EXPERIMENTAL INHALATION POISONING WITH CARBON DISULFIDE. II. ANALYSIS OF BIOCHEMICAL CHANGES IN LIVER HOMOGENATE AND ITS FRACTIONS.

(Ger.) Gregorczyk, J.; Wieckowski, B.; Wesolowska, T. (Instytut Chorob Wewnetrznych PAM. Al. Postancow 72, 70-111 Szczecin, Poland). *Int. Arch. Arbeitsmed.* (34):151-166; 1975.

The biochemical and morphological changes in rat hepatocytes resulting from CS_2 challenge were investigated. Adult male Wistar rats were exposed to CS_2, 1.33 mg/l of air, in a closed chamber for 12 weeks, 4 days/week, 5 hr/day (group A); 26 weeks, 4 days/week, 5 hr/day (group B); or 10 weeks, 4 days/week, 10 hr/day (group C). Liver homogenization and subcellular fraction preparation followed sacrifice at 72 hr after the final CS_2 exposure. Malic dehydrogenase (MDH), LDH, asparagine aminotransferase, alanine aminotransferase, and acid phosphatase in the total homogenate and in mitochondrial, light mitochondrial, heavy microsome, and supernatant fractions showed no significant difference between control and experimental groups (each group with 26 animals). In group B, glucose-6-phosphatase in total homogenate was depressed to 15.4 U/mg protein compared to 24.5 for controls ($p<0.02$). The percent of total MDH isoenzyme 2 activity in the supernate was depressed to 43.6 from a control level of 49.8 ($p<0.05$) in group A, and to 44.3 from 50.6 ($p=0.05$) in group B. Mitochondrial MDH isoenzyme 3 was decreased (percent of total activity) from 34.8 for the controls to 29.3 ($p<0.01$) in group B. Supernate MDH3 was increased (in percent) from 47.4 (controls) to 52.9 in group A and from 46.8 (controls) to 52.2 in group B ($p<0.05$). In the LDH spectrum, only the LDH5 profile decreased in total homogenate, in percent of total activity, from 89.2 to 83.9 ($p<0.05$

in group A and from 90.4 to 87.5 ($p<0.05$) in group B. Protein from homogenate and supernate showed no difference in total amount or in electrophoretic separation, nor was there any group difference in alpha-amino acids or 16 free amino acids. The biochemical modifications are attributed to host adaptation and not to CS_2 toxicity.

7790 THE ISOLATED HEPATOCYTE AS THE TARGET CELL OF IMMUNOLOGICAL REACTIONS. (Ger.) Hopf, U. (II Med. Univ.-Klinik, 65 Mainz, Langenbeckstrasse 1, W. Germany). *Z. Gastroenterol.* 13(Suppl.):289-291; 1975.

A brief review of the isolated hepatocyte in cytotoxic immune reactions is presented. The antigenic structure of the hepatocyte membrane, cell vitality indices, modalities of liver cell cultures, *in vitro* cytotoxicity, and membrane-bound immunoglobulins were topically discussed. There is no presently satisfactory test system for demonstrating cytotoxic immune reactions in the isolated hepatocyte. Unpublished studies of hepatocytes harvested from punch biopsies of metabolic or inflammatory liver disease patients are cited. Incubated with FITC-labeled human immunoglobulin (Ig) G rabbit antisera, a membrane-bound IgG could be detected in 9/34 patients with acute viral hepatitis B and 17/54 cases with chronic active hepatitis. Patients with acute viral hepatitis A, chronic persisting hepatitis, or metabolic disease were negative. The predominantly hepatitis B surface antigen (HBsAg)-positive chronic active hepatitis cases receiving immunosuppressive therapy had IgG on the hepatocytes, but serum antibodies against HBsAg could not be demonstrated, and autoimmune phenomena were rare.

7791 SITE OF BILE ACID ABSORPTION IN THE RAT. (Eng.) Sklan, D.; Budowski, P.; Hurwitz, S. (Faculty of Agriculture, Hebrew Univ. Jerusalem, Rehovot, Israel). *Lipids* 11(6):467-471; 1976.

The site and extent of bile acid absorption were measured *in vivo* in the isolated small intestine of male CR rats using $^{91}YCl_3$ (25-50 μCi/kg in the diet) as a nonabsorbed reference substance. Independently, the uptake and transfer of bile acids from ligated intestinal segments were measured *in situ*. Mucosal and serosal transport of 0.015 μCi tauro(^{14}C-carbonyl)cholic acid in 0.5 ml test solution was measured in intestinal loops. The secretion of bile acids into the duodenum was 9 g/kg/24 hr. Around 50% of the bile acids found in the duodenum were absorbed in the proximal half of the small intestine, but the absorption of bile acids by the entire small intestine amounted to 90%. *In situ*, the percentage of mucosal uptake was greater in the ileal loop, but the absolute mucosal uptake of bile acids was greater in the jejunal loop. Serosal transfer was lower in the jejunal loop than in the ileum, whether expressed as absolute or percentage transfer. Serosal transport is the limiting stage of bile acid absorption in the jejunum, but not in the ileum. The percentage mucosal uptake (28%) and the percentage serosal transfer (11%) in the jejunum remained constant upon incubation with either 4 or 8 mg/ml bile acids. Increasing bile acid concentrations did not affect the percentage disappearance of dose from the jejunum, but they reduced the percentage mucosal uptake in the ileum. It is concluded that in the rats the proximal small intestine is as important in the absorption of bile acids as the distal small intestine.

7792 BILE ACID METABOLISM IN MAMMALS. VIII. BILIARY SECRETION OF CHOLYLARGININE BY THE ISOLATED PERFUSED RAT LIVER. (Eng.) Yousef, I. M.; Fisher, M. M. (Dept. Medicine, Univ. Toronto, Toronto, Ontario M5S 1A8, Canada). *Can. J. Physiol. Pharmacol.* 53(5):880-887; 1975.

The characterization and identification of cholylarginine formed during the metabolism of cholic acid in the isolated perfused Wistar rat liver system were investigated. Cholic acid (30 μmol) was added to the medium, and the perfusion was continued for 3 hr. Thin-layer chromatography of the secreted bile showed four bile acid conjugates with R_f values of 0.24 (cholyltaurine), 0.40 (unknown compound I), 0.49 (cholylglycine), and 0.85 (unknown compound II, much more polar than free cholic acid). Gas-liquid chromatography showed that compound II had a molecular weight greater than that of cholyltaurine. The retention times relative to cholylglycine were compound I, 1.15; cholyltaurine, 1.54; and compound II, 1.90. It comprised 15%-27% of the biliary bile acids in these experiments. Amino acid analysis of the hydrolyzed conjugate demonstrated the presence of arginine. Perfusion studies with radioactive arginine and mass spectrometry of the acetyl derivative of the methyl ester of compound II proved that it was cholylarginine.

7793 BILE ACIDS: XLVII. 12α-HYDROXYLATION OF PRECURSORS OF ALLO BILE ACIDS BY RABBIT LIVER MICROSOMES. (Eng.) Ali, S. S.; Elliott, W. H. (Dept. Biochemistry, Univ. Karachi, Karachi, Pakistan). *Biochim. Biophys. Acta* 409(2):249-257; 1975.

The effects of several parameters on the rate of 12α-hydroxylation of 3β-^{3}H- or 24-^{14}C-allochenodeoxycholic acid and $5\alpha,6\alpha$-$^{3}H_2$-5α-cholestane-3α,7α-diol by rabbit liver microsomal preparations fortified with NADPH were investigated. Microsomal preparations fortified with 0.1 mM NADPH effectively promoted hydroxylation of the two acids and the diol to their respective 12α-hydroxyl derivatives in yields of about 25% or 65% in 60 min. Minor amounts of other products were formed with the diol. The requirements for activity of rabbit liver microsomal 12α-hydroxylase resembled those of rat liver microsomes; i.e., 0.1 mM NADPH is a necessary cofactor. 12α-Hydroxylase activity was significantly reduced after 2-7 weeks storage at -20 C. Metal chelating agents such as o-phenanthroline and EDTA did not inhibit 12α-hydroxylation to a significant extent. Striking inhibition (92%-94%) occurred only with 1 mM p-chloromercuribenzoate. Addition of 10 mM glutathione to the incubation mixture enhanced the reaction up to 75% for allochenodeoxycholic acid and 16% for the diol. There was no difference in the quantity of product produced from the ^3H- or the ^{14}C-labeled acid. No clear sex or age difference was found in the enzyme activity.

7794 PURIFICATION AND PROPERTIES OF ALKALINE PHOSPHATASE FROM HUMAN BILE. (Eng.) Sugiura, M.; Hirano, K.; Iino, S.; Suzuki, H.; Oda, T. (Dept. Pharmacy, Tokyo Coll. Pharmacy, Ueno-Sakuragi, 1-Chome, Taito-ku, Tokyo, 110, Japan). *Chem. Pharm. Bull. (Tokyo)* 23(9):2019-2024; 1975.

Alkaline phosphatase (AP) from human bile was purified by butanol treatment, protamine sulfate treatment, diethylaminoethyl (DEAE)-cellulose, carboxymethyl cellulose, DEAE-Sephadex A-50 chromatography and Sephadex G-200 gel filtration. The enzyme was purified 15,000-fold, and its homogeneity was confirmed by disk electrophoresis. The recovery of AP was poor, mainly because of the great drop of activity during gel filtration. The addition of 10^{-5} M $ZnCl_2$ and $MgCl_2$ to the buffer solution prevented this drop to a certain extent. The molecular weight of AP was 180,000 daltons. The purified enzyme was similar to human placental and intestinal AP with respect to the influence of various compounds [marked inhibition by 10^{-3} and 10^{-4} M EDTA (to 2% and 37%, resp.) and N-bromosuccinimide (to 1% and 7%)], optimum pH (10.5), pH stability (4-11), and isoelectric point (4.75). However, Mg^{2+} and Zn^{2+} ions activated the biliary AP to a greater extent than the human placental and intestinal forms. The thermal stability of biliary AP was similar to that of intestinal AP, but different from the placental enzyme. Because the biliary AP was inhibited to 69% and 74% activity by homoarginine (10^{-3}-10^{-4} M), a strong inhibitor of liver AP, it is suggested that the biliary form originated from the liver. It was not inhibited by L-phenylalanine, which does inhibit placental and intestinal AP.

7795 RELEASE OF VITAMIN B_{12}-BINDING PROTEIN FROM ISOLATED RAT LIVER PERFUSED WITH A SYNTHETIC MEDIUM. (Eng.) Novakova, V.; Gullberg, R. (King Gustaf Fifth Res. Inst., Stockholm, Sweden). *Acta Physiol. Scand.* 96(4):500-505; 1976.

Studies were carried out to determine whether the unsaturated vitamin B_{12}-binding capacity (UBBC) of the small molecular sized vitamin B_{12}-binding protein (SBP) released by the isolated rat liver reflects the condition of the liver. Changes in the UBBC of SBP were compared with the release of albumin into a perfusion medium and with the fluid pressure in the portal vein under various conditions. When Sprague-Dawley rat livers were perfused with medium containing a gas carrier (FC-80) at a high flow rate (52 ml/min), the functional state of the liver during the first 3 hr of perfusion was good, as indicated by a high level of albumin release (2.1 mg/hr/100 g) and a low stable portal pressure. The rate of increase in UBBC of SBP release during this time was 20,000-50,000 pg B_{12}/hr/100 g of donor body weight. After the third hour, the rates of albumin and UBBC of SBP release decreased and portal pressure increased, reflecting the formation of fibrin which blocked the vascular system and produced hypoxia. In another series, the liver was also perfused with medium containing gas carrier, but at a slower rate (24 ml/min). The UBBC of SBP at 3 hr was lower (8,000-15,000 pg/hr/100 g) than in the first experiment. The albumin level increased continuously during this experiment, but at a lower level (0.48 mg/hr/100 g). When liver damage was induced after 3 hr by the addition of noradrenalin (100 μg/80 ml medium/hr), the deterioration of liver function was reflected by an increase in portal pressure and a decrease in UBBC of SBP, but not by a decrease in albumin release. In a series of experiments in which no gas carrier was used and the perfusion was carried out at 24 ml/min, hypoxia was reflected by decreases in albumin release and UBBC of SBP (600-9,000 pg/hr/100 g during the first 3 hr) but not by an increase in portal pressure. These experiments demonstrate that the fluid pressure in the portal vein is an accurate indicator of the circulatory state of the perfused liver, but is not always an indicator of the condition of the liver. Albumin release is a good indicator of the functional state, but seems to respond slowly to liver damag However, the amount of UBBC of SBP release sensitively reflects both functional capacity to produce proteins and the presence of liver damage.

7796 KINETICS OF HEPATIC UPTAKE OF UNCONJUGATE BILIRUBIN. (Eng.) Paumgartner, G.; Reichen, J. (Dept. Clinical Pharmacology, Univ. Berne, Murtenstrasse 35, CH-3010 Berne, Switzerland). *Cli Sci. Mol. Med.* 51(2):169-176; 1976.

Hepatic bilirubin uptake was studied in the perfuse Sprague-Dawley rat liver by a multiple-indicator dilution technique, to study the kinetics of bilirubin uptake and to determine whether bilirubin and bile acids enter the hepatocyte via a common or separate pathway. The kinetics of hepatic bilirubin uptake could be described by the Michaelis-Menten equation. The maximal uptake velocity (V_{max}) and the apparent half-saturation constant (K_m) were 4.4 ± 0.5 nmol/sec/g of liver and 58 ± 16 nmol/g of liver, resp., indicating that the hepatic uptake sy tem for bilirubin under normal conditions is operat far below saturation. Sodium taurocholate did not compete with bilirubin for hepatic uptake. These findings are consistent with the concept that carri mediated transport is responsible for hepatocellula uptake of bilirubin and that bilirubin and bile acids enter the hepatocyte via separate pathways.

7797 ON THE AUTOXIDATION OF BILIRUBIN. (Eng.) Lightner, D. A.; Cu, A.; McDonagh, A. F.; Palma, L. A. (Dept. Chemistry, Univ. Nevada, Reno, NV 89507). *Biochem. Biophys. Res. Commun.* 69(3): 648-657; 1976.

The instability of various oxygenated aqueous solutions of bilirubin (BR) in the dark was investigate The disappearance of BR was monitored spectrophotometerically by recording the visible spectrum of each solution at 1-hr intervals and after the decrease of the absorbance maximum of BR near 440 nm.

Solutions were either purged with Ar and then kept stoppered in the dark or subjected to O_2 or N_2 bubbling. Autoxidation occurred in aqueous solutions over a pH range 7.4-13.2 in the presence of even traces of oxygen. At pH 7.4-8.9, bilirubin precipitated from 2.5×10^{-5} M solutions and adsorbed to the walls of the glass container. In ammonical methanol, chloroform, and dimethyl sulfoxide, aggregation phenomena did not occur and autoxidation was very slow. No unusual buffer effects were observed, but there was a trend toward a greater degree of autoxidation with increasing pH. This trend may be more apparent than real, since at the lower pH values the amount of BR truly in solution and available for autoxidation was progressively reduced by aggregation. These studies showed that the instability of aqueous solutions of BR in the dark is due to autoxidation, aggregation, and surface adsorption.

7798 EARLY INHIBITION OF HEPATIC BILIRUBIN CONJUGATION AFTER PARACETAMOL (ACETAMINOPHEN) ADMINISTRATION IN THE RAT. (Eng.) David, M.; Ideo, G.; Harrison, N. G.; Williams, R. (Liver Unit, King's Coll. Hosp. and Medical Sch., Denmark Hill, London SE5 8RX, England). *Digestion* 13(1/2):42-48; 1975.

The early inhibition of hepatic bilirubin conjugation after administration of paracetamol (acetaminophen; 13.3 mmol/kg body weight) was investigated in male Wistar rats. The drug was administered in an aqueous suspension by stomach tube. In rats killed 48 hr later, mild centrilobular hepatic necrosis and elevated plasma aspartate aminotransferase levels were found. The histology and enzyme levels were normal 2 hr after dosing. Control and paracetamol-treated animals given i.v. bilirubin loads (35 μmol/kg) and killed 5 min after injection had similar plasma bilirubin levels (245 and 248.9 μmol/liter, resp.); 98%-100% was unconjugated. The total hepatic bilirubin content was also similar (12.8 and 13.6 nmol/g liver, resp.). However, only 28% was unconjugated in the controls, but in the treated animals this form accounted for 56% of the total ($p<0.001$). At 30 min, plasma bilirubin levels were higher in the treated animals, a result of an increase in the unconjugated fraction (126.1, versus 71.6 μmol/liter in controls). Hepatic total bilirubin levels were also higher in treated animals than in controls (11.0 and 7.0 nmol/g liver, resp., $p<0.001$), due to an increase in both forms ($p<0.005$). Hepatic activities of bilirubin uridine diphosphate-glucuronyltransferase were similar in the two groups. Bile flows were higher ($p<0.05$) in the treated rats, but bilirubin concentration ($p<0.001$) and its excretion ($p<0.02$) were lower than in the controls. Hepatic glucuronide conjugation is impaired early after paracetamol overdose; the impairment precedes the accumulation and binding of the hepatotoxic metabolite of the drug within the liver cells.

7799 BIOCHEMICAL CHANGES AFTER HEPATIC INJURY FROM TOXIC DOSES OF ACETAMINOPHEN OR FUROSEMIDE. (Eng.) Thorgeirsson, S. S.; Sasame, H. A.; Mitchell, J. R.; Jollow, D. J.; Potter, W. Z. (Lab. Chemical Pharmacology, Natl. Heart and Lung Inst., NIH, Bethesda, MD 20014). *Pharmacology* 14(3):205-217; 1976.

The effects of hepatotoxic doses (400 mg/kg, i.p.) of acetaminophen (AAP) and furosemide (FE) on the function and composition of hepatic endoplasmic reticulum were compared 3-24 hr after administration to GP mice and male Syrian hamsters. Liver sections, obtained 6, 12, or 24 hr after drug administration, demonstrated a striking centrilobular (with AAP) or midzonal-centrilobular necrosis (with FE), involving from 10%-40% of the parenchymal hepatocytes. Twelve hours after administration of FE, the triglycerides were significantly decreased (5.44 mg/g liver versus 13.32 mg for controls; $p<0.05$), but treatment with 2,000 mg/kg carbon tetrachloride markedly increased these compounds (24.67 mg; $p<0.05$). AAP caused a significant decrease in microsomal protein concentration as early as 3 hr after administration (9.1 mg/g liver versus 14.5 mg for controls; $p<0.05$); FE did not produce any decreases until 24 hr (8.6 mg; $p<0.05$). Cytochrome P-450 concentrations declined to 48% and 32% of control values at 12 and 24 hr, resp., after AAP and to 57% and 36% at 12 and 24 hr, resp., after FE. Cytochrome b_5 was also decreased, but not as much. Loss of microsomal heme was proportional to the observed decreases in the cytochrome. NADPH cytochrome c reductase was impaired only at 24 hr after administration of either drug. Microsomal ethylmorphine N-demethylase and aniline hydroxylase activities were decreased by both drugs, but glucose-6-phosphatase and uridine diphosphate-glucuronyltransferase were not affected significantly. Incorporation of ^{3}H-L-leucine into liver proteins was decreased 50% by AAP or FE. Administration of AAP and FE to adult mice produced structural changes in the hepatic endoplasmic reticulum and alterations in some membrane-related functions within 24 hr. However, the distorted function is not only due to destruction of the smooth endoplasmic reticulum, since some membrane-associated functions remained.

7800 EVIDENCE FOR THE POSSIBLE FORMATION OF A TOXIC TYROSINE METABOLITE BY THE LIVER MICROSOMAL DRUG METABOLIZING SYSTEM. (Eng.) David, J. C. (U.E.R. de Biochimie, Faculte des Sciences, 2, place Jussieu, F-75005 Paris, France). *Naunyn Schmiedebergs Arch. Pharmacol.* 292(1):79-86; 1976.

The possibility that the liver microsomal drug-metabolizing system might metabolize tyrosine to a toxic compound was explored. The effects of several inducers and inhibitors of this system were measured in decarboxylase-inhibited [50 mg/kg N_1-(DL-seryl)-N_2-(2,3,4-dihydroxybenzylhydrazine, i.p., twice daily)] male MF_1 mice given 0.5-3.5 g/kg tyrosine, p.o., twice daily. Pretreatment of mice with 50 mg/kg SKF 525A (2-diethylaminoethyl-2,2-diphenylvalerate, HCl), i.p., or 60 mg/kg cobaltous chloride, i.p., increased the LD_{50} for tyrosine from 1.38 g/kg to >3.5 and 3 g/kg twice daily, resp. Pretreatment with 80 mg/kg phenobarbital, i.p., or 50 mg/kg 3-methylcholanthrene, i.p., reduced the LD_{50} from 1.38 g/kg to 0.6 and 0.8 g/kg, resp. Mice were also pretreated with two compounds that affect glutathione availability: 100 mg/kg diethylmaleate, i.p., greatly potentiated tyrosine toxicity (LD_{50}, 0.55 g/kg), but 50 mg/kg cysteine, i.p., had the opposite effect (LD_{50}, 2 g/kg). Tyrosine depleted the liver glutathione levels as much as 50%. It is concluded that the liver microsomal drug-metabolizing system is capable of converting tyrosine to a toxic metabolite, perhaps a 2,3-epoxide of tyrosine.

7801 THE EFFECT OF ACETYLCHOLINE ON BILE FLOW.

(Eng.) Nevasaari, K.; Karki, N. T. (Dept. Pharmacology, Univ. Oulu, 90220 Oulu 22, Finland). *Arch. Int. Pharmacodyn. Ther.* 221(2):283-293; 1976.

The effect of acetylcholine (AcC) on bile flow was studied in the isolated perfused liver of male Sprague-Dawley rats. The flow rate of the perfusion medium through the liver was 1.9 ml/g liver/min. The highest AcC concentration (5 x 10^{-4} M) in the medium decreased the perfusate flow rate by 8.7%. Atropine ($< 10^{-4}$ M) inhibited this effect, but physostigmine (1 x 10^{-6} M) and pilocarpine (10^{-7} to 5 x 10^{-4} M) had no effect. However, if physostigmine was added to the medium before AcC, the flow rate was decreased at a lower AcC concentration (1 x 10^{-4} M). About 1 min after the addition of AcC (5 x 10^{-4} M), the bile flow stopped (slow phase), and was followed by an increase (fast phase) and a subsequent return to control levels. The effect was similar to mechanical clamping and opening of the common bile duct. With increasing dose, this biphasic effect is increased, and the smaller the amount of outflowing bile during the slow phase the greater the flow during the fast phase. The effect of AcC was antagonized by atropine but, as with the perfusate, potentiated by physostigmine, so that even 10^{-7} M AcC changed the bile flow. The results suggest that AcC and atropine can pass in a pharmacologically active form from hepatic sinusoidal blood into the biliary tract, affecting it and bile secretion. This may explain the decreased and increased bile flow caused by cholinergic drugs or vagal stimulation.

7802 PRESENCE OR ABSENCE OF INHIBITORS OF CRYSTAL GROWTH IN BILE. 1. EFFECT OF BILE ON THE FORMATION OF CALCIUM PHOSPHATE, A CONSTITUENT OF GALLSTONES.

(Eng.) Sutor, D. J.; Percival, J. M. (Dept. Chemistry, Univ. Coll., Gower St., London, England). *Gut* 17(7):506-510; 1976.

The inhibitory action of bile on the nucleation and crystal growth of calcium phosphate (in the form of apatite) was studied. A solution of 10 ml disodium hydrogen phosphate (0.02 M) and 30 ml water was adjusted to pH 7.0, and 10 ml calcium chloride dihydrate was added. The effect of inhibitors in this system was studied by the addition of sodium citrate or pyrophosphate or samples of bile from gallbladders or common bile ducts to the water. Some samples were ultrafiltered through a filter with a molecular weight cut-off of about 10,000. A micellar solution of sodium taurocholate and egg lecithin was also tested. When the pH of the system was adjusted to 7.0, a precipitate formed, which consisted of a crystalline material with a diffraction pattern like that of apatite, but the *d*-spacing of one of the lines was different. This apatite-like material could be converted to apatite on standing. Small amounts of sodium citrate or pyrophospate (10^{-5} M), could delay the formation of the crystalline phase for about 20 min. In contrast, an added concentration equivalent to 1.8 x 10^{-2} M sodium chloride was necessary for the ionic strength to affect the reaction. Both the gallbladder and common duct biles inhibited formation of the precipitate. In one case, 0.16% gallbladder bile delayed crystallization for 24 min and inhibited the amorphous phase for 18 min. Larger quantities of some samples of gallbladder bile sometimes prevented formation of the initial amorphous precipitate; in one case the solution remained clear for 24 hr. All bile samples caused considerable inhibition in the formation of the precipitate, but equivalent volumes of bile ultrafiltrate usually showed little inhibitory power. A concentration of 1 mM sodium taurocholate and 0.3 mM lecithin in the test system delayed the formation of the crystalline phase for 90 min; concentrations of these substances of 0.6 and 0.2 mM, resp., inhibited this change for 60 min. It is concluded that an inhibitor is present in both the common duct and gallbladder bile, that it probably originates in the liver, and that it has a molecular weight of over 10,000.

7803 EFFECT OF (+)-CATECHIN ON CONJUGATION BY RAT LIVER.

(Eng.) Hargreaves, T.; Piper, R. F. *In: New Trends in the Therapy of Liver Disease. Proceedings of the International Symposium on New Trends in the Therapy of Liver Diseases, Tirrenia June 6-7, 1974.* (New York: S. Karger): pp. 154-163; 1975.

The effect of (+)-catechin on bilirubin and *o*-aminophenol conjugation by rat liver was investigated in male albino Wistar rats. Diazotized ethyl anthranilate was used to measure conjugated bilirubin, and chloroform extraction was used to measure unconjugated bilirubin in rat liver slices. The slices were added to a phosphate, bicarbonate, serum, and bilirubin medium containing (+)-catechin in final concentrations of 0.005, 0.01, 0.05, 0.1, 1, 5, and 10 mM. (+)-Catechin inhibited the formation of conjugated bilirubin in the medium 32-88% with increasing concentration. At 0.1, 1.0, and 10.0 mM (+)-catechin, the conjugated bilirubin content was lower (20.1, 15.0, and 16.9 μg/g liver, resp.) than controls (32.8 μg); although at 0.01 mM the content was higher than controls (42.5 μg). At 10 mM, (+)-catechin decreased the unconjugated bilirubin content (118 versus 195 μg/g for controls). Addition of 2 and 5 mM (+)-catechin to rat liver microsomes in the presence of uridine diphosphate (UDP)-glucuronyltransferase decreased the formation of conjugated bilirubin. A double reciprocal Lineweaver-Burk plot of bilirubin conjugation in the presence and absence of (+)-catechin showed that (+)-catechin competitively inhibits bilirubin conjugation by the enzyme. (+)-Catechin also inhibited *o*-aminophenol conjugation by rat liver.

7804 CYTOCHROME P-450 AND ANIT (α-NAPHTHYL-ISOTHIOCYANATE) INTOXICATION. (Eng.)

Breschi, M. C.; Ducci, M.; Mazzanti, L. *In: New Trends in the Therapy of Liver Disease. Proceedings of the International Symposium on New Trends in the Therapy of Liver Diseases, Tirrenia, June 6-7, 1974.* (New York: S. Karger): pp. 55-61; 1975.

The variation of cytochrome P-450 levels after treatment with iron dextran (Inferon) or Inferon and α-naphthyl isothiocyanate (ANIT) was investigated in male rats. Rats were fed a standard diet alone or with ANIT (1 g/kg food) and/or Inferon (50 mg/kg body weight i.p., twice a week). The animals were sacrificed after 24 and 48 hr (acute intoxication) or after 50, 70, and 90 days (chronic intoxication). Liver weights (g/100 g body weight) varied with duration of treatment: they increased sharply in animals receiving ANIT alone (4, 4, and 4.8 g versus 3.2 g for controls) or ANIT + Inferon (6.3, 5.6, and 6.2 g) (after 50, 70, and 90 days, resp.). At 24 and 48 hr, cytochrome P-450 levels (nM/g liver tissue) increased significantly only in animals treated with ANIT + Interferon (7.3 nM and 8.2 nM versus 6.1 nM for controls). With chronic treatment, the levels were high in animals treated with ANIT alone (12, 9.5, and 8.5 nM after 50, 70, and 90 days, resp.); in animals with ANIT + Interferon, the values were the same as controls (6.1 nM). The peak level was reached on the 50th day and then gradually diminished. After chronic treatment with ANIT alone, there was massive degeneration of the liver; when Inferon was added, it protected the liver from this toxic action. The results show that ANIT enhances the hepatic content of cytochrome P-450 and that this enhancement is inhibited by Inferon.

7805 THE STIMULATORY EFFECT OF FRUCTOSE ON ETHANOL METABOLISM. (Eng.)

Scholz, R.; Schwabe, U.; Plauk, C.; Nohl, H. (Institut fur Physiologische Chemie und Physikalische Biochemie der Universitat Munchen, Goethestrasse 33, D-8000 Munich, W. Germany). *Nutr. Metab.* 18(Suppl. 1):79-92; 1975.

The stimulatory effect of fructose on ethanol (EtOH) oxidation at the cellular level is discussed based on experiments with isolated livers from fasted rats perfused with Krebs-Henseleit bicarbonate buffer in a noncirculating system. EtOH utilization at various concentrations (0.1-2 mM) was gauged in the absence and presence of fructose (4 mM) by the arteriovenous concentration differences and the constant flow rate (5 ml/g/min). The results showed that the rate-limiting step in overall EtOH metabolism is the process of NADH oxidation. Since this limitation is overcome in the presence of fructose, fructose may stimulate EtOH metabolism via an increased oxidation of NADH. The effect of EtOH on fructose metabolism was also investigated. O_2 consumption and glucose, lactate, and pyruvate production were calculated using 4 mM fructose in the presence and absence of 1.2, 2.4, 5, and 15 mM EtOH. In the presence of EtOH, energy-yielding fructolysis was suppressed, but the energy-consuming synthesis of glucose and glycerol was enhanced, and overall fructose metabolism required 10 times more ATP from oxidative phosphorylation. The linear relation found between the extra NADH derived from stimulated EtOH oxidation and the extra ATP utilized for fructose metabolism supports the hypothesis that fructose stimulated EtOH oxidation indirectly, by increasing the energy consumption of the liver. Fructose metabolism and EtOH oxidation must interact at the level of the mitochondrial respiratory chain. The data suggest that maximum rates of NAD-dependent EtOH oxidation depend on the activity of the respiratory chain and, therefore, on the energy requirement of the liver cell in a given metabolic state.

7806 INHIBITION OF HEPATIC UPTAKE OF ALPHA AMINOISOBUTYRIC ACID BY ETHANOL: EFFECTS OF PYRAZOLE AND METABOLITES OF ETHANOL. (Eng.)

Piccirillo, V. J.; Chambers, J. W. (Toxicology Res. Dept., Rohm and Haas, Dublin Lab., 582 W. Goodale St., Columbus, OH). *Res. Commun. Chem. Pathol. Pharmacol.* 13(2):297-308; 1976.

The inhibition of hepatic uptake of α-aminoisobutyric acid (AIB) by ethanol (EtOH) was investigated in isolated perfused Sprague-Dawley rat livers to determine the effects of pyrazole and metabolites of EtOH. After an initial 30-min equilibrium period, 100 μmol of AIB containing 2 μCi of $1\text{-}^{14}C$-AIB was added to the perfusing medium. Uptake of AIB by the liver reached equilibrium 90 min later. Approximately 20% of the labeled AIB was removed from the perfusate in control experiments, but this value was reduced to 11% after the addition of EtOH (200 mg/100 ml). Pyrazole (4 mM) alone was without effect on AIB uptake. When pyrazole was added with EtOH, AIB uptake was similar to control values. Two metabolits of EtOH, 2 mM acetaldehyde and 43 mM acetate, had no effect on AIB uptake. The isolated perfused rat liver produced 7.13 mg of urea nitrogen in control AIB experiments during a 2-hr perfusion period. The amount was reduced to 5.10 mg/2 hr when 200 mg of EtOH was added to the perfusate, but this inhibition was reversed by the addition of pyrazole. The results suggest that the effect of EtOH on AIB uptake is not a direct effect of the alcohol, but due to a metabolic consequence of EtOH oxidation (through an altered $NAD:NADH_2$ ratio).

7807 MOLECULAR INJURY TO MITOCHONDRIA PRODUCED BY ETHANOL AND ACETALDEHYDE. (Eng.)

Cederbaum, A. I.; Rubin, E. (Mount Sinai Sch. Medicine, City Univ. New York, NY 10029). *Biol. Alcohol Alcoholism* 34(11):2045-2051; 1975.

The possible role of mitochondrial function in the increased rate of hepatic ethanol metabolism, seen in rats after chronic ethanol administration, was evaluated by studying energy production and utilization by isolated hepatic mitochondria and the activity of reconstituted shuttles for the transport of reducing equivalents. Male Sprague-Dawley rats were fed for 24-36 days on a liquid diet, with or without ethanol (accounting for 36% of total calories) as an isocaloric replacement of carbohydrate. The mitochondria of ethanol-fed rats had a reduced ability to oxidize various substrates; the oxygen uptake by these mitochondria was reduced by 49%, 50%, 32%, and 11% using glutamate, α-ketoglutarate, succinate, and ascorbate as substrates, resp. Ethanol feeding also affected the energy-dependent Ca^{2+} uptake system of the mitochondria; when substrate or ATP were omitted or when citrinin plus oligomycin were added to inhibit endogenous energy sources, Ca^{2+} uptake was decreased by 90%. The mitochondria displayed reductions in the activity of cytochrome oxidase, succinic dehydrogenase, and α-glycerophosphate oxidase, and the cytochrome content was decreased. There was no change in the mitochondrial yield or concentration in the ethanol-fed rats. The acceleration of ethanol oxidation induced by ethanol feeding was not explained by increases in mitochondrial activity, capacity of shuttles for the transport of reducing equivalents into the mitochondria, or alcohol dehydrogenase activity. The effects of acetaldehyde on mitochondrial functions were found to be similar to those of ethanol consumption, e.g., greater sensitivity of NAD^+-dependent oxygen uptake, selective inhibition of oxidative phosphorylation, and decreased energized Ca^{2+} uptake. *In vitro,* ethanol at concentrations up to 80 mM had no effect on any of the reactions that were effected *in vivo.* The inhibition of electron transport, of energy formation and utilization, and of the reconstituted shuttles suggests the possibility that acetaldehyde may influence the overall metabolism of ethanol.

7808 STUDIES ON POISONOUS METALS. II. EFFECT OF CHELATING AGENTS ON EXCRETION OF CADMIUM THROUGH BILE AND GASTROINTESTINAL MUCOSA IN RATS. (Eng.) Kojima, S.; Kiyozumi, M.; Saito, K. (Faculty Pharmaceutical Sciences, Kumamoto Univ., Kumamoto, Japan). *Chem. Pharm. Bull. (Tokyo)* 24 (1):16-21; 1976.

The excretion of cadmium through the bile and gastrointestinal mucosa after the i.p. administration of cadmium chloride and the effect of the chelating agents EDTA, citric acid, 2,3-dimercapto-1-propanol, L-cysteine, D-cysteine, and DL-penicillamine on its excretion were studied in male Wistar rats. The cumulative biliary excretion of cadmium in a 9-hr period was about 0.85% of the dose (3 mg/kg), and the cumulative content of cadmium in the gastrointestinal lumen was about 0.53% of the dose. The i.v. administration of citric acid (60 mg/kg), D-cysteine (100 mg/kg), and DL-penicillamine (120 mg/kg) increased the mean cumulative biliary excretion to 4.47%, 4.33%, and 2.39% of the dose, resp., in comparison to a control value of 0.95%. The administration of EDTA (90 mg/kg) completely inhibited biliary excretion, and the administration of 2,3-dimercapto-1-propanol (100 mg/kg) reduced biliary excretion to 0.40% of the dose. DL-cysteine had no effect on biliary excretion. None of the chelating agents had a significant effect on the excretion of cadmium via the gastrointestinal mucosa. EDTA, DL-penicillamine, and 2,3-dimercapto-1-propanol produced a decrease in the hepatic cadmium content (20.50%, 47.12%, and 23.51% of dose, resp.) in comparison to that in the untreated control liver (57.79%). Sephadex G-75 chromatography of the bile of rats treated with cadmium, with or without a chelating agent, indicated that cadmium in the bile was bound to several bile components with different molecular weights and that cadmium in the bile of the rats that received cadmium chloride with citric acid, D-cysteine, and DL-penicillamine was largely bound to the substances with a low molecular weight.

7809 MODIFICATIONS OF CITRATE AND ISOCITRATE METABOLISM IN LIVER MITOCHONDRIA OF ETHANOL-FED RATS. (Eng.) Lostanlen, D.; Oudea, M.-C.; Godard-Launay, A.-N.; Oudea, P. (Laboratoire de Pathologie Cellulaire Hepatique, Equipe de Recherche Centre National de la Recherche Scientifique no 334, U.E.R. de Medecine, 1, rue Gaston Veil, 44035-Nantes Cedex, France). *Biochem. Pharmacol.* 24(22): 2061-2068; 1975.

The transports of citrate and isocitrate and the activity of enzymes involved in their metabolism were studied in mitochondria isolated from rat alcoholic fatty livers. Male Sprague-Dawley rats were given a liquid hyperlipidic diet in which ethanol was progressively substituted isocalorically for part of the carbohydrate in weekly stages (25, 37.5 43, and 50 g/l). After 11 weeks on the last dose, the rats were sacrificed and mitochondrial fractions were prepared from the liver. The reduction intramitochondrial pyridine nucleotides following addition of citrate or isocitrate (0.4 to 12 mM), malate (0.6 M), and phosphate (1.2 mM) to the mitochondria was assayed. Upon citrate addition, a 79% increase ($p < 0.001$) in reduction was observed in mitochondria from ethanol-fed rats compared to a contro group. This increase was not observed with isocitrate, possibly because of transport alterations. The efflux of isocitrate exchanged for extramitochondrial citrate was reduced markedly (-50% in ethanol-fed rats), but ^{14}C-citrate penetration into malate-loaded mitochondria was only slightly ($p<0.0$ inhibited and ^{14}C-malate transport was unchanged. Pyridine nucleotide reduction was accelerated when citrate was added to Triton X100-disrupted mitochondria. The following intermitochondrial changes may contribute to this acceleration: increased activit of aconitate hydratase (32%) and NAD-linked isocitrate dehydrogenase (11%), and higher mitochondrial pyridine nucleotide levels (21-35%). The increased utilization of citrate by mitochondria, along with loss of cytosolic ATP-citrate lyase activity in ethanol-fed rats, may depress fatty acid synthesis, in response to an accumulation of triglycerides in the liver cell.

7810 PROTECTING ACTION OF ASPARTATE ON THE HEPATIC CHANGES INDUCED BY D-GALACTOSAMINE (Eng.) Fodor, O.; Schvartz, M.; Suciu, A.; Barbarino, F.; Duca, S.; Lezeu, R. (Clinica III medical str. Iasilor 16, Cluj, Rumania). *Arzneim. Forsch.* 26(5):855-858; 1976.

The protective action of aspartic acid on galactosamine-induced liver changes was studied biochemically in Wistar rats. The rats received galactosa mine (460 mg/kg, i.p.) with or without a simultaneous i.p. injection of potassium aspartate (430 mg); untreated animals served as controls. Between 30 and 120 min after the beginning of perfusion of the isolated livers, the mean SGOT and SGPT levels in the controls were 8.36-14.96 mU/ml and 2.40-7.68 mU/ml, resp. The levels in the galactosamine-treated animals were 10.12-32.12 mU/ml and 7.40-24.34 mU/ml, resp., and the levels in the animals treated with galactosamine plus aspartate were 11.56-18.86 mU/ml and 5.32-13.34 mU/ml, resp. The mean levels of sorbital dehydrogenase in the perfused livers of controls, galactosamine-treated animals, and galactosamine plus aspartate-treated animals were 0.03-2.11 mU/ml, 1.69-4.52 mU/ml, and 0.42-2.26 mU/ml, resp. The lactate/pyruvate ratios in the groups were 10.93-20.43, 8.61-12.64, and 12.31-16.30, resp. The mean level of glycogen in the livers of rats with galactosamine hepatitis (23.31 μM glucose/g fresh liver) was much lower than that in controls (203.99 μM/g, $p<0.001$) and in aspartate-treated animals (89.42 μM/g, $p<0.001$). Methyl green-pyronine staining revealed a stronger pyroninophilia of the cytoplasmic RNA after the administration of aspartate than that in animals treated with galactosamine only. The $NADH_2$-diaphorase reaction was nearly normal in the rats treated with galactosamine plus aspartate, while the reaction in those treated with galactosamine alone indicated exclusive diphormazane formation. The glucose-6-phosphatase, membrane ATPase, and PAS reactions also indicated a protective action of aspartate. The results demonstrate the protective action of aspartate in galactosamine hepatitis. This action may be due to the ability of aspartate to reestablish the cellular deficit of pyridine nucleotides.

7811 THE INHIBITION BY GLUCAGON OF THE VASOCONSTRICTOR ACTIONS OF NORADRENALINE, ANGIOTENSIN AND VASOPRESSIN ON THE HEPATIC ARTERIAL VASCULAR BED OF THE DOG. (Eng.) Richardson, P. D. I.; Withrington, P. G. (Medical Coll. of St. Bartholomew's Hosp., Charterhouse Square, London, EC1M 6BQ, England). *Br. J. Pharmacol.* 57(1):93-102; 1976.

The influence of glucagon on the vasoconstrictor actions of noradrenalin, angiotensin, and vasopressin on the hepatic arterial vascular bed was investigated in anesthetized dogs. The hepatic artery was cannulated and perfused from a femoral artery, with continuous monitoring of blood flow and perfusion pressure. Intra-arterial injections of the vasoconstrictor agents resulted in dose-dependent increases in hepatic arterial vascular resistance (HAVR). A single injection of glucagon (G, 100 μg, intra-arterial) caused a transient fall in HAVR of 20%, while G infusions (25 μg/min) reduced the HAVR by 17%. Single injections of G (100 μg, intra-arterial) reduced the responses to the three vasoconstrictors by 85-90%, with recovery by 8-10 min. Intra-arterial infusions of G (2.5-50 μg/min) reduced the increase in the HAVR in response to the vasoconstrictors throughout the course of the infusion. Intra-arterial infusions of G (25 μg/min) resulted in a shift of the dose-response curves for noradrenalin and angiotensin to the right, but there was no suppression of the maximal response. The dose-response curve for vasopressin during G infusion was also shifted to the right, but there was also a reduction in the maximal response to approximately 50%. Insulin (10 IU) caused a transient reduction in the HAVR and a weak and transient inhibition of the effect of test doses of noradrenalin. It is suggested that the antagonism by G of the vasoconstrictor responses of the hepatic arterial vasculature may be important in protecting against the effects of concomitantly released vasoconstrictors on this bed.

7812 STIMULATION OF THE GLUCURONIC ACID PATHWAY IN ISOLATED RAT LIVER CELLS BY PHENOBARBITAL. (Eng.) Notten, W. R. F.; Henderson, P. Th.; Kuyper, Ch. M. A. (Dept. Pharmacology, Univ. Nijmegen, Nijmegen, Netherlands). *Int. J. Biochem.* 6(10):713-718; 1975.

The effect of phenobarbital (PB) on the synthesis of glycogen and the metabolites uridine diphosphate glucose (UDPG), uridine diphosphate glucuronic acid (UDPGA), D-glucuronic acid, L-ascorbic acid, and D-glucaric acid was investigated in intact parenchymal cells isolated from the male Wistar rat liver. Administration of 0.5 and 1.0 mM PB to suspensions of rat hepatocytes resulted, within 90 min, in an enhanced synthesis of D-glucaric acid [$p<0.05$ (0.5 mM); $p<0.001$ (1.0 mM)], L-ascorbic acid ($p<0.05$, $p<0.001$), and UDPGA ($p<0.05$, at both concentrations). There were no alterations in the *in vitro* activities of UDPG dehydrogenase and UDP glucuronyltransferase within 120 min after PB. At increasing PB concentrations the UDPG level increased significantly [$p<0.01$ (0.5 mM); $p<0.001$ (1.0 mM)], but that of glycogen decreased ($p<0.011$). ^{14}C-labeling experiments showed a lower rate of 1-^{14}C-D-glucose incorporation in the glycogen of PB-treated cells, but an equal increase in specific activities as a function of time was observed in both PB-treated and control cells. This strongly suggests that the lowered glycogen concentration, after treatment with PB, is caused by a decreased synthesis of glycogen, resulting in an enhanced availability of UDPG. It is concluded that a stimulation of the D-glucuronic acid pathway is probably based on an inhibition of glycogen synthesis.

7813 INCREASED BILIARY EXCRETION OF PENTOBARBITAL WITH BILE SALT-INDUCED HEPATIC CHOLERESIS. (Eng.) Knodell, R. G.; Holloway, E. E. (Dept. Hematology, Walter Reed Army Inst. Res., Walter Reed Army Medical Center, Washington, DC 20012). *Biochem. Pharmacol.* 25(14):1682-1684; 1976.

Studies were carried out to determine whether bile salt-induced increases in bile blow might also enhance biliary excretion of pentobarbital. Male Walter Reed rats with external biliary fistulae were perfused with either saline (bile salt-depleted animals) or with 10 or 30 mg/hr of taurocholate. Pentobarbital (40 mg/kg, i.v.) was administered, and bile was collected hourly for 4 hr. Total biliary excretion of pentobarbital and its metabolites in both bile salt-depleted and bile-salt perfused animals showed a linear relation to bile flow. The mean level of biliary pentobarbital excretion in the group perfused with 30 mg/hr of taurocholate (45.91%) was significantly increased compared with that of the bile salt-depleted group (34.35%, $p<0.05$). When the changes in bile flow rate and pentobarbital biliary excretion in the bile salt-perfused animals were compared graphically, statistically significant increases in pentobarbital excretion were seen in both the 10 mg/hr and 30 mg/hr taurocholate-perfused groups. Taurocholate perfusion had no significant effect on the form in which pentobarbital was excreted into bile. These studies show that biliary excretion of pentobarbital and its metabolites is increased by bile salt perfusion. Interdependence between bile flow rates and biliary excretion could explain the increased pentobarbital excretion in response to taurocholate perfusion. If bile salt-induced choleresis can be shown to increase hepatic drug metabolism by depletion of intrahepatic metabolites or to enhance biliary excretion of unchanged parent compounds or active metabolites, it may be a useful means of rapidly manipulating hepatic excretory function.

7814 INTERACTION OF PENTOBARBITAL, DIPHENYLHYDANTOIN AND DIGITOXIN WITH ETHANOL IN THE ISOLATED PERFUSED GUINEA-PIG LIVER. (Eng.)

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The interaction of ethanol with the metabolism of ^{14}C-pentobarbital, ^{14}C-diphenylhydantoin, and ^{3}H-digitoxin was studied in the isolated perfused guinea pig liver. The mean rate of ethanol oxidation (1.71 mmol/hr) was not altered by the addition of pentobarbital (0.25 mg/100 ml), diphenylhydantoin (0.23 mg/100 ml), or digitoxin (0.0045 mg/100 ml). When ethanol was included in the perfusion, the disappearance of ^{14}C-diphenylhydantoin and ^{14}C-pentobarbital was decreased to 50% of the initial level and the disappearance of ^{3}H-digitoxin was decreased to 20% of the initial level. Ethanol decreased the plasma-chloroform ratio for each of the drugs. Only 3-5% of the radioactivity of ^{14}C-pentobarbital and ^{14}C-diphenylhydantoin was excreted via the bile. Ethanol caused a pronounced accumulation of these two drugs in the liver. Corresponding to the increased radioactivity in the liver, a decrease in the perfusion medium was found. The distribution of radioactivity after the application of ^{3}H-digitoxin was not significantly altered by ethanol, and a large amount of ^{3}H-digitoxin metabolites was excreted in the bile; the radioactivity was concentrated in the bile 200-fold, as compared to the concentration in the perfusion medium. The accumulation of radioactive material in the liver after the application of ^{14}C-pentobarbital and ^{14}C-diphenylhydantoin was accompanied by an increase in the liver tissue-plasma ratio (1.66 versus 2.99 after pentobarbital; 4.00 versus 10.10 after diphenylhydantoin) and by a decrease in the liver-chloroform coefficient I (1.25 versus 0.59 after pentobarbital; 0.132 versus 0.078 after diphenylhydantoin) and the liver-chloroform coefficient II (0.23 versus 0.14 after pentobarbital; 0.023 versus 0.015 after diphenylhydantoin). These results suggest that the accumulation of the drugs in the liver is due to an increase of the lipid solubility of the radioactivity accumulated in the liver. These modifications were not observed with ^{3}H-digitoxin.

7815 EFFECT OF PHOSPHOLIPID ON LIPID METABOLISM IN EXPERIMENTAL FATTY LIVER. (Eng.)

Negishi, I.; Aizawa, Y. (Tokyo Coll. Pharmacy, Sinjuku-ku, Tokyo, Japan). *Chem. Pharm. Bull. (Tokyo)* 23(9):1938-1942; 1975.

The effect of phospholipid on fatty liver induced by orotic acid, carbon tetrachloride (CCl_4), or ethionin was investigated in female Wistar rats. In rats fed a semisynthetic diet supplemented with 1% orotic acid liver glycerides increased 523% (compared with controls), and the contents of liver phospholipid, protein, and serum β-lipoprotein were depressed to 65.1%, 70.2%, and 53%, resp. These effects were restored by the administration of ox brain phospholipid. Liver glycerides in rats given CCl_4 (0.5 ml/100 g, p.o.) or ethionine (100 mg/100 g, i.p.) increased seven- and threefold, resp., and the serum β-lipoprotein was decreased. Phospholipid partially restored these effects. Liver phospholipid was slightly decreased by CCl_4, and liver protein was decreased by CCl_4 and ethionine. Both depressions were unaffected by phospholipids. These results indicate that phospholipid is effective in counteracting the depression of serum β-lipoprotein and liver lipid accumulation by orotic acid, CCl_4, or ethionine.

7816 INHIBITION OF HEPATIC LIPOGENESIS BY ADENINE NUCLEOTIDES. (Eng.)

Harris, R. A.; Yount, R. A. (Dept. Biochemistry, Indiana Univ. Sch. Medicine, Indianapolis, IN 46202). *Lipids* 10(11):673-680; 1975.

The effect of cyclic AMP on the hepatocyte pool size of the noncyclic adenine nucleotides and on hepatic lipogenesis was studied using liver slices and isolated liver cells of male Wistar rats. Incubation of liver slices with 5 mM cyclic AMP resulted in increases in the mean ATP, ADP, AMP, and inorganic phosphate content (0.88, 0.39, 0.14, and 3.9 μmol/g, resp., versus 0.67, 0.24, 0.09, and 3.2 μmol/g in untreated slices). AMP (5 mM) also increased these levels (0.81, 0.28, 0.05, and 5.6 μmol/g, resp., versus 0.61, 0.23, 0.07, and 3.6 μmol/g before treatment). AMP reduced the rate of fatty acid synthesis, from a control level of 52 nmol/min/g to 32, 7, and 8 nmol/min/g with 0.5, 2.5, and 5.0 mM AMP, resp. Cyclic AMP reduced lipogenesis to 18, 4, and 2 nmol/min/g with 0.5, 2.5, and 5.0 mM concentrations. Dibutyryl cyclic AMP (0.05 mM) reduced lipogenesis to 3 nmol/min/g, but did not increase the intracellular adenine nucleotide content. Fatty acid synthesis was also inhibited by ADP, ATP, and adenosine. Similar results were obtained with isolated hepatocytes, although they were more sensitive to AMP, cyclic AMP, ADP, ATP, adenosine, and dibutyryl cyclic AMP; 0.5 mM AMP produced only a 38% inhibition in liver slices, whereas this concentration produced 92% inhibition in the liver cells. Because of the expansion of the adenine nucleotide pool size, high concentrations of cyclic AMP should not be used to investigate the mechanism responsible for hormonal regulation of lipogenesis. AMP was also found to produce a significant increase in the intracellular concentration of cyclic AMP in the isolated liver cells, which may be a factor in the inhibition of lipogenesis by AMP.

7817 CHARACTERISTICS COMMON TO CHOLERETIC INCREMENTS OF BILE INDUCED BY THEOPHYLLINE, GLUCAGON, AND SQ-20009 IN THE DOG. (Eng.)

Barnhart, J. L.; Combes, B. (Univ. Texas Southwestern Medical Sch., Dallas, TX 75235). *Proc. Soc. Exp. Biol. Med.* 150(3):591-596; 1975.

The characteristics of the increased bile formed in response to the administration of theophylline, glucagon, and 1-ethyl-4-(isopropylidenehydrazino)-1H-pyrazole-(3,4-b)-pyridine-5-carboxylic acid (SQ-20009), which also presumably increase the intracellular concentration of cyclic AMP, were studied in dogs. The compounds were administered into one jugular vein, while a mixture of sodium taurocholate (2 mg/ml) and ^{14}C-erythritol was infused into the other. Theophylline (19.9 mg/kg), glucagon (loading dose of 108 µg, followed by a continuous mean infusion of 0.58 µg/kg/min or a single dose of 2.2 µg/kg), and SQ-20009 (4.7 mg/kg or a loading dose of 2 mg followed by a constant mean infusion of 0.073 mg/kg/min) all caused significant increases in bile flow; the mean change in bile flow for each compound was 0.111, 0.083, and 0.055 ml/min, resp. Choleresis was accompanied by proportionate increases in ^{14}C-erythritol clearance in bile. The average ratio of change in erythritol clearance to change in bile flow for each compound was: theophylline, 1.12; glucagon, 1.07; and SQ-20009, 0.85. None of these means was statistically significantly different from 1.0 or from any other. Bile salt excretion decreased by 1.5 µmol/min on the average in dogs receiving theophylline and did not change significantly in animals given the other compounds. The mean concentrations of sodium, potassium, chloride, and bicarbonate ions were measured in bile taken during the control and treatment periods. The electrolyte composition was practically the same after treatment with each compound. These observations support the important role of cyclic AMP in the sequence of events leading to the formation of the bile salt-independent fraction of canalicular bile in the dog.

7818 INFLUENCE OF EXPERIMENTAL, PROXIMAL AND DISTAL BILE-FLOW OBSTRUCTION ON ACTIVITY AND NUMBER OF ISOENZYME AMYLASE IN SERUM AND URINE OF RATS. (Eng.)

Miholjcic, M.; Radovanovic, J.; Selak, I. (Dept. Physiology and Biochemistry, Univ. Sarajevo, Sarajevo, Yugoslavia). *Folia Med.* 9:161-172; 1974.

The influence of laparotomy and ligation of the proximal and distal bile flows on rat serum and urine amylase activity was investigated. Laparotomy did not cause any significant changes in urine and serum amylase activity. Ligation of the proximal end of the bile flow did not produce any significant changes in serum amylase activity on day 1. From days 3 to 16, the activity increased about twice as much ($p<0.001$). There was also a significant increase in urine activity from the 1st ($p<0.05$) to the 8th day ($p<0.001$), but on day 16 this activity was less than that of controls. Distal ligation caused a significant increase in serum activity from days 3 to 16 ($p<0.001$). The urine activity differed: up to 5 days it was increased and was greater than controls ($p<0.001$), but from 8 to 16 days, it became significantly lower ($p<0.001$) than controls. The results show that there is no difference in serum and urine amylase activity of laparotomized rats or rats with ligatures of the distal or proximal end of the bile flow.

7819 EFFECT OF GAMMA RADIATION ON THE ENZYMATIC ACTIVITY OF CELL ORGANELLES OF LIVER AND EPITHELIUM OF SMALL INTESTINE IN RABBITS. (Eng.)

Kanski, M.; Pilek, K.; Zachara, B.; Kosiorek, B. (Zaklad Biochemii, Pl 9 Maja 1, 90-647 Lodz, Poland). *Pol. Med. Sci. Hist. Bull.* 15/3(5/6):607-612; 1975.

The protein content and enzyme marker activity were determined in the homogenate and $140,000 \times g$ supernatant of rabbit liver and intestinal epithelium on days 1, 3, 6, 9, 15, and 30 after a single exposure to ^{60}Co irradiation (550 rads). The protein content of liver homogenates peaked at 145% of controls by the 3rd to 6th day, and in intestinal epithelium, it was 2.5 times normal on the 3rd day. Negligible changes in protein were observed in the supernatants. Both liver and intestinal homogenates had a maximal fall in succinate dehydrogenase activity of the 1st day, with a return to normal values by day 9 in the liver and day 15 in the intestine. Glucose-6-phosphatase fell slightly in liver homogenates and supernatants in the 1st and 3rd day after irradiation and was still low at 30 days. A marked decrease in this enzyme activity (to 47%) was noted in intestinal homogenates after 1 day, and this slowly rose to normal values by day 30. Negligible changes were seen in the intestinal supernatant. The only change in acid phosphatase was a negligible decrease in the homogenate of the intestinal epithelium on the 3rd day. Uricase was decreased in homogenates and supernatants of both tissues on the 1st day; the peak depression of uricase activity in intestinal homogenates was observed on day 3. 5-Nucleotidase was normal in both homogenates and supernatants of liver, but a striking and persistent increase in its activity occurred in intestinal homogenates; changes in the intestinal supernatant were negligible. Alkaline phosphatase increased on the 1st day in liver homogenates and supernatants and reached a maximum on the 6th day, with gradual normalization by day 30. Alkaline phosphatase activity in the intestinal homogenates increased considerably from day 1 on and remained elevated on day 30. This enzyme did not greatly change in the intestinal supernatants.

7820 THE MECHANISM OF THE EFFECT OF INCREASED BILIARY PRESSURE ON HEPATIC CIRCULATION. (Eng.)

Szabo, G.; Jakab, F.; Magyar, Z. (Natl. Inst. Traumatology, H-1430 Budapest, Mezo Imre ut 17, Hungary). *Acta Med. Acad. Sci. Hung.* 31(3/4):241-250; 1974.

The hypothesis that the increase in hepatic arterial blood flow seen after the occlusion of the common duct and the resultant increase in biliary pressure is a myogenic reaction was tested in dogs with common duct cannulae. The sudden experimental increase in biliary pressure to 40 mm Hg (produced by infusing physiological saline into the common duct) resulted in an immediate 39% increase in the hepatic arterial blood flow. Concomitantly, the portal venous flow decreased by 9.5%. When biliary pressure was raised gradually by increments of 5 mm Hg at 5-min intervals, there was little change in hepatic arterial flow when the biliary pressure was under 20 mm Hg. A sudden increase in flow occurred between 20 and 35 mm Hg. When the common duct pressure was raised by saline infusion, hepatic arterial flow increased abruptly, reaching a maximum value in about 30 sec, and remained at this level during the 5-15 min observation time. When biliary pressure dropped to zero, hepatic arterial flow returned slowly to the control value (5-10 min). When dextran or serum was used to increase common duct pressure in place of saline, hepatic arterial flow increased to a level similar to that seen with saline, reaching a maximum in 0.5-1 min; the flow decreased rapidly at sustained high duct pressure, attaining the control value in less than 3 min. The effect of increased biliary pressure was unchanged by i.v. injections of phentolamine (0.2-0.4 mg/kg), phenoxybenzamine (2 mg/kg), propranolone (0.2-0.3 mg/kg), or atropine (0.5-1.0 mg/kg). The vasodilatory response was elicited even during vasoconstriction induced by norepinephrine (10 μg/min). It is concluded that the increase in hepatic arterial flow is caused by a myogenic arteriolar vasodilatation, which is triggered by the decrease in effective vascular transmural pressure.

7821 INDUCTION OF MICROSOMAL MONOXYGENASE OF THE LIVER IN EXPERIMENTAL CHOLESTASIS. (Rus.) Zakharova, N. E.; Mordvinov, V. A.; Tsyrlov, I. B.; Lyakhovich, V. V. (Inst. Experimental Clinical Medicine, USSR Acad. Medical Sciences, Siberian Branch, Novosibirsk, USSR). *Biull. Eksp. Biol. Med.* 81(4):418-420; 1976.

Microsomal monoxygenase induction by phenobarbital in the absence of substrate binding sites in cytochrome P-450 active centers was studied in male Wistar rats. Experimental cholestasis was produced by the ligation of the bile duct. The animals received sodium phenobarbital (100 mg/kg/day) on days 4, 5, and 6 after operation. Sham-operated rats were used as controls. The cholestasis was accompanied by the accumulation of hydroxylated cholesterol metabolites having detergent characteristics, which destroyed the substrate binding site for phenobarbital in the P-450 molecule. Consequently, the primary conjugation and metabolism of phenobarbital by the enzyme was impossible. Pronounced induction of microsomal monoxygenases by phenobarbital was observed. The activation of *de novo* microsomal protein synthesis is assumed to be effected by the phenobarbital molecule proper, and not by the products of its primary hydroxylation in the microsomes.

7822 MOUSE HEPATIC NEOPLASIA. SIGNIFICANCE A EXTRAPOLATION TO MAN. (Eng.) Newberne, J. W. *In: Mouse Hepatic Neoplasia. Proceedings o a Workshop held at the H.T.S. Management Centre, L End, High Wycombe, (Great Britain), 12-17 May 1974* (New York: Elsevier Scientific Publishing Company pp. 165-177; 1975.

The problem of the response of the mouse liver to chemical agents is discussed. In this workshop, th participants were unable to develop a consensus on a precise distinction between benign and malignant neoplasms in the mouse liver, and they were unable define objective criteria essential to such judgements. Objective criteria have not been defined that would clearly indicate whether the mouse liver accurately reflects the general carcinogenicity of a compound. The utility of the mouse for purposes of routine screening of chemicals for carcinogenic potential is, therefore, highly questionable. It i suggested that strong consideration be given to deleting the mouse as a routine test animal for such purposes, although the species should definitely be retained as a useful system for studies in experimental carcinogenesis. A reliable procedure for assigning levels of significance (relative safety, risk factor) to carcinogenic responses should be developed. It is suggested that such a system might incorporate as one facet, the statistical treatment of data. This would require that a carcinogenic dose be defined and that the dose-response concept be accepted for carcinogenicity evaluation as it is for other types of toxicological investigations.

7823 ASSOCIATION OF MOUSE LIVER ADENOSINE 3': CYCLIC MONOPHOSPHATE (CYCLIC AMP) LEVELS WITH HISTOCOMPATIBILITY-2 GENOTYPE. (Eng.) Meruel D.; Edidin, M. (Dept. Biology, Johns Hopkins Univ., Baltimore, MD 21218). *Proc. Natl. Acad. Sci. USA* 72(7):2644-2648; 1975.

7824 HEMOPOIETIC COLONY FORMING CELLS IN REGEN RATING MOUSE LIVER. (Eng.) Hays, E. F.; Firkin, F. C.; Koga, Y.; Hays, D. M. (Dept. Medicin Univ. California, Center for Health Sciences, Los Angeles, CA 90024). *J. Cell. Physiol.* 86(2):213-219; 1975.

7825 PRIMARY CULTURE OF NORMAL ADULT RAT LIVE CELLS WHICH MAINTAIN STABLE UREA CYCLE E ZYMES. (Eng.) Lin, R. C.; Snodgrass, P. J. (India Univ. Sch. Medicine, Indianapolis, IN 46202). *Bioc Biophys. Res. Commun.* 64(2):725-734; 1975.

7826 ALTERATIONS OF TYROSINE AMINOTRANSFERASE ACTIVITY AND ULTRASTRUCTURE OF RAT LIVER AFTER HIGH-LEVEL SPINAL CORD SECTION AND D-GALACTOSAMINE ADMINISTRATION. (Eng.) Vaptzarova, K. I.; Popov, P. G.; Dimova, R. N.; Stoykova, A. S.; Rosentall, L. H.; Chelibonova-Lorer, H. (Inst. General and Comparative Pathology Animals, Bulgarian Acad. Sciences, Sofia 31, Bulgaria). *C.R. Acad. Bulg. Sc* 28(7):991-994; 1975.

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7828 SODIUM PERIODATE, SODIUM CHLORITE, AND ORGANIC HYDROPEROXIDES AS HYDROXYLATING AGENTS IN HEPATIC MICROSOMAL STEROID HYDROXYLATION REACTIONS CATALYZED BY CYTOCHROME p-450. (Eng.) Hrycay, E. G.; Gustafsson, J. A.; Ingelman-Sundberg, M.; Ernster, L. (Arrhenius Lab., Univ. Stockholm, Stockholm, Sweden). *FEBS Lett.* 56(1):161-165; 1975.

7829 RADIOPROTECTION OF LIPOGENESIS FROM GLUCOSE (U-^{14}C) AND ACTIVITIES OF PYRIDINE NUCLEOTIDE DEHYDROGENASES IN LIVER OF GAMMA-IRRADIATED FEMALE RATS BY CYSTAMINE. (Eng.) Ramanathan, R.; Misra, U. K. (Vallabhbhai Patel Chest Inst., Univ. Delhi, Delhi 110 007, India). *Int. J. Radiat. Biol.* 28(1):35-43; 1975.

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7832 THE RELATIVE RATE OF SYNTHESIS OF LIVER URIDINE DIPHOSPHATE SUGARS IN D-GALACTOSAMINE-TREATED RATS. (Eng.) Zhivkov, V.; Chelibonova-Lorer, H. (Inst. General Comparative Pathology, Bulgarian Acad. Sciences, Sofia, Bulgaria). *Int. J. Biochem.* 6(6):429-433; 1975.

7833 RADIOISOTOPIC ASSAY FOR RAT LIVER SULFOTRANSFERASE ACTIVITY. (Eng.) Davis, D. C. (Emory Univ. Sch. Medicine, Atlanta, GA 30322). *Biochem. Pharmacol.* 24(9):975-978; 1975.

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Tubingen, Wilhelmstr. 56, D-74 Tubingen, W. Germany). *Drug Metab. Dispos.* 3(5):338-344; 1975.

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7848 IN VIVO AND IN VITRO STUDIES ON IRREVERSIBLE BINDING OF HALOTHANE METABOLITES TO PROTEINS. (Eng.) Hempel, V.; Remmer, H. (Inst. Toxicology, Univ. Tubingen, D-74 Tubingen, W. Germany). *Experientia* 31(6):580-581; 1975.

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7850 MICROSOMAL SPECTRAL PROPERTIES AND NARCOTIC N-DEMETHYLASE ACTIVITY IN METHADONE-DEPENDENT RATS. (Eng.) Spaulding, T. C.; Kotake, A. N.; Takemori, A. E. (Sch. Pharmacy, Univ. Minnesota, Minneapolis, MN 55455). *Drug Metab. Dispos.* 4(1):45-52; 1976.

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See also, 7718, 7742, 7772, 7873, 7903.

SECRETION AND METABOLISM

Intestine

7855 ISOLATION AND CHARACTERIZATION OF IRON-BINDING PROTEINS FROM RAT INTESTINAL MUCOSA. (Eng.) Huebers, H.; Huebers, E.; Rummel, W.; Crichton, R. R. (Institut fur Pharmakologie und Toxikologie, Universitat des Saarlandes, D-6650 Homburg Saar, W. Germany). *Eur. J. Biochem.* 66(3):447-455; 1976.

Two iron-binding proteins were isolated from the rat intestinal mucosa and characterized as mucosal ferritin and mucosal transferrin. Polyacrylamide gel electrophoresis revealed that rat mucosal, spleen, and liver ferritin migrated to approximately the same extent and was less acidic than horse ferritin. Both mucosal and plasma transferrin migrated similarly and gave two bands. Isoelectric focusing of rat mucosal ferritin gave a single band with an isoelectric point (IEP) of 5.1. The IEP of spleen and liver ferritin was 5.2. Plasma transferrin gave two bands (IEP 5.7 and 5.6), as did mucosal transferrin (IEP 5.5, 5.3). The molecular weights of spleen, liver, and mucosal ferritin were 19,300, 19,000, and 19,200, esp., while the molecular weights of plasma and mu-osal transferrin were 77,000 and 76,000, resp. The edimentation constants for spleen, liver, and mucosal erritin were 17.6, 17.3, and 17.5, resp. The iron ontent of mucosal ferritin (550 atoms/molecule) as considerably less than that of the spleen and iver ferritins (3,300 and 3,000 atoms/molecule, esp.). Isopycnic density-gradient centrifugation f the mucosal ferritin demonstrated a population of olecules with an iron content of 450-800 iron atoms/olecule and little full ferritin. Unlike plasma ransferrin, mucosal transferrin could be labeled with ^{9}Fe only when incubated with the iron salt and a mu-osal homogenate. Immunological analysis of the three at ferritins with horse spleen ferritin indicated artial cross reaction with each of the proteins. at mucosal transferrin strongly cross-reacted with ntiserum prepared in rabbits against rat serum trans-errin. The amino acid composition of the rat fer-itins varied considerably, with the most marked dif-erences in tyrosine, glutamic acid, threonine, serine, eucine, and arginine. This study confirms that the ucosal iron-binding proteins are tissue-specific ransferrin and ferritin; transferrin is important or iron transfer through the mucosal cells in iron eficiency, while ferritin is the iron-binding inter-ediate that participates in the slow phase of iron osorption.

356 SUBSTRATE INTERACTIONS ON THE INTESTINAL MUCOSA: A CONCEPT FOR THE REGULATION OF NTESTINAL DIGESTION. (Eng.) Ugolev, A. M.; Gruzd-ov, A. A.; De Laey, P.; Egorova, V. V.; Iezuitova, . N.; Koltushkina, G. G.; Timofeeva, N. M.; Tulya-anova, E. Ch.; Tsvetkova, V. A.; Chernyakhovskaya, . Yu.; Shcherbakov, G. G. (I.P. Pavlov Inst. Phy-iology, Academy Sciences USSR, Leningrad, USSR). *r. J. Nutr.* 34(2):205-220; 1975.

he hydrolysis of glycyl-L-leucine, glycyl-L-tyrosine, ributyrin, sucrose, maltose, soluble starch, and α-nd β-glycerophosphates by everted segments of rat ntestine was estimated separately or in combination. here was a significant interaction between differ-nt substrates, which affected their digestion. Two ypes of interaction were identified. In the first ype, products of hydrolysis affected the hydrolysis f homologous substances; e.g, methionine and ala-ine inhibited glycyl-L-leucine hydrolysis, and mal-ose reduced glucoamylase (α-1,4-glucan glucohydro-ase) activity (intracatenary interactions). In the econd type of interaction, the products of hydroly-is interfered with the hydrolysis of a different roup of substances; e.g., tributyrin inhibited di-eptidase (glycyl-L-leucine hydrolase) and alkaline hosphatase, and glycyl-L-leucine interfered with he activity of the latter enzyme (intercatenary nteractions). Mechanisms of interactions were uggested by the results of a comparison of the ex-ent of inhibition or activation of glycyl-L-leucine ydrolase and alkaline phosphatase *in situ* in evert-d intestinal segments or after solubilization with apain or Triton X-100 and different treatments nown to affect allosteric sites of these enzymes. ributyrin and dipeptides acted on alkaline phospha-ase as allosteric regulators. A discontinuity of the Arrhenius plot suggested the existence of different enzyme conformations that were rearranged by tributyrin. Substrate interactions in digestion were found in adult rat, cat, rabbit, and hen. Substantial differences were found between classes (Aves and Mammalia), between orders (rodents, lagomorphs, and carnovores), and between age groups within an animal strain. These interactions are thought to be involved in the coordination of digestion with intestinal absorption and to regulate the time and site of subsequent hydrolysis.

7857 DIFFERENTIAL SENSITIVITY OF INTESTINAL BRUSH BORDER ENZYMES TO PANCREATIC AND LYSOSOMAL PROTEASES. (Eng.) Seetharam, B.; Grimme, N.; Goodwin, C.; Alpers, D. H. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *Life Sci.* 18(1):89-95; 1976.

The degradation of enzymes of the brush border membranes of human small intestine by proteolytic enzymes was studied. The isolated brush border membranes were prepared from autopsy material within 10 hr of death. At pH 7, free trehalase was degraded by bovine pancreatic trypsin at the same rate as membrane-bound trehalase, whereas elastase had more effect on solubilized trehalase. Trypsin, chymotrypsin, and elastase had similar effects on both free and bound sucrase, which was the most sensitive of the hydrolases to the action of the proteolytic enzymes. Alkaline phosphatase, bound or free, was the most resistant of the hydrolases to proteolytic degradation. It is concluded that solubilization from the membrane does not enhance the susceptibility of the hydrolases to proteolysis. Chymotrypsin had little effect on sucrase and alkaline phosphatase at pH 5, while trehalase was inactivated by chymotrypsin at acidic pH and was less susceptible at pH 7 and 8. Alkaline phosphatase was rather stable in face of chymotrypsin at acid pH; at pH 7 and 8, only about 20% of its activity was lost. When brush border membrane was exposed to varying concentrations of rat liver lysosomal extracts at pH 5, alkaline phosphatase was not inactivated, sucrase was very slightly affected, and approximately 50% of the trehalase activity was lost. The degradation of trehalase was time dependent and approximated first-order kinetics. Boiled lysosomal extracts were inactive against trehalase, suggesting an enzymatic reaction. It is suggested that the brush border membrane of the intestine is subject to proteolysis by pancreatic enzymes from the external cell surface and by lysosomal proteases within the cell.

7858 METHIONINE METABOLISM IN MAMMALS: S-ADENOSYLHOMOCYSTEINE HYDROLASE IN RAT INTESTINAL MUCOSA. (Eng.) Finkelstein, J. D.; Harris, B. (Veterans Admin. Hosp., Washington, DC). *Arch. Biochem. Biophys.* 171(1):282-286; 1975.

In a previous experiment, *S*-adenosylhomocysteine hydrolase could not be detected in extracts of rat small intestinal mucosa, but a heat-labile factor that inhibited hepatic *S*-adenosylhomocysteine hydrolase was detected in this tissue. The present experiments were carried out to test the hypothesis that inhibition results from the consumption of the substrate adenosine by adenosine deaminase present in the crude intestinal preparations. Enzyme activity was assayed by measuring the rate of *S*-adenosyl-L-homocysteine (AdoHcy) synthesis. When the adenosine deaminase inhibitor, 6-methylaminopurine-9-ribofuranoside (MAPR, 1 mM) was added to the small intestinal extracts from Sprague-Dawley rats, a compound chromatographically inseparable from authentic AdoHcy was synthesized as a linear function of the concentration of the intestinal extract. AdoHcy synthesis was also demonstrated in the absence of MAPR by the intestinal protein fraction that is precipitated between 40 and 60% saturation with ammonium sulfate. However, this fraction retained significant adenosine deaminase, and the synthesis of AdoHcy increased from 7.6 to 354 nmol/30 min when MAPR was added. The rate of disappearance of AdoHcy (15 μM) incubated with intestinal extract was proportional to the volume of intestinal extract added (0.01-0.1 ml). The rate of disappearance of AdoHcy was also proportional to the concentration of substrate; the consumption of substrate was almost complete at concentrations below 5 μM. By employing the reaction velocities at the higher substrate concentrations (10-90 μM), a tentative value of 33 M for the K_m was obtained. The products of AdoHcy hydrolysis were identified; the sulfur amino acid portion yielded homocysteine. In the absence of any inhibitor, the purine moiety was degraded to uric acid. The results indicate that intestinal mucosa contains an AdoHcy hydrolase that possesses many of the properties previously found for the liver enzyme. No evidence for an alternative reaction for the catabolism of AdoHcy was found.

7859 STRUCTURE-FUNCTION STUDIES OF THE INTERACTION OF THE HORMONALLY ACTIVE FORM OF VITAMIN D_3, $1\alpha,25$-DIHYDROXY-VITAMIN D_3, WITH THE INTESTINE.

(Eng.) Norman, A. W.; Procsal, D. A.; Okamura, W. H.; Wing, R. M. (Dept. Biochemistry, Univ. California, Riverside, CA 95202). *J. Steroid Biochem.* 6(3/4):461-467; 1975.

Recent developments in the chemistry, metabolism, and mechanism of action of vitamin D are reviewed. The steroid cholecalciferol, or vitamin D_3, undergoes a successive two-step hydroxylation, first in the liver to give 25-hydroxy-D_3, and then in the kidney to produce $1\alpha,25$-dihydroxy-D_3 ($1\alpha,25\text{-(OH)}_2\text{-}D_3$), the biologically active form. The biological response to $1\alpha,25\text{-(OH)}_2\text{-}D_3$ in target tissues (intestine, bone, and possibly kidney) is a consequence of association with cytoplasmic and nuclear receptors. A steroid competition assay was devised using receptors present in intestinal chromatin. A comparison of the relative competition in the assay and biological activity of several analogs had defined some of the essential structural elements required for vitamin D activity. These structure-function relationships are discussed with particular emphasis on the A-ring conformation. The A ring of these seco-steroids consists of a pair of rapidly equilibrating chair conformers. As a consequence, different chair conformations produce different orientations of substituent groups in the A ring. It is proposed that the 1α-hydroxyl of $1\alpha,25\text{-(OH)}_2\text{-}D_3$ or its geometric equivalent in analogs must occupy the equatorial orientation for optimization of biological activity. Data are presented that support the conclusion that $1\alpha,25\text{-(OH)}_2\text{-}D_3$ must first bind with a specific receptor protein present in the cytoplasm of target cells; this is followed by movement into the nuclei, where the steroid associated with a finite number of specific chromatin receptor sites.

7860 BILE ACID STIMULATION OF COLONIC ADENYLATE CYCLASE AND SECRETION IN THE RABBIT.

(Eng Conley, D. R.; Coyne, M. J.; Bonorris, G. G.; Chung, A.; Schoenfield, L. J. (Knoxville Gastroenterology Group, Assoc., Suite 100, Physicians Office Building 1928 Alcoa Highway, Knoxville, TN 37920). *Am. J. Dig. Dis.* 21(6):453-458; 1976.

The *in vivo* effects of various doses of deoxycholic acid (DCA) on adenylate cyclase (AC) activity and net secretion in the rabbit colon were investigated in female New Zealand white rabbits. Four loops, separated from one another by double ligature were constructed in the ascending colon, and 1 ml of test or control solution was injected into the lumen of each loop through the antimesenteric border. The test solutions were 10 mM dibutyryl cyclic 3',5'-AMP and 1, 2, 4, 6, and 8 mM DCA. Significant ($p<0.01$) secretory responses were produced with 4, 6, and 8 m DCA (0.26, 1.2, and 1.9 ml/cm, resp.) compared to co trols (0.13 ml/cm). The increases in AC activity fo 1, 2, 4, 6, and 8 mM DCA were 134%, 161%, 205%, 236% and 401% of control values, resp., all significantly greater than control ($p<0.01$) except the 1-mM value. At 8 mM, the activity was 126 pmol cAMP/mg protein/min. The AC activity and colonic secretion correlated directly ($p<0.02$) at doses of 4, 6, and 8 mM DCA. There was a significant depression of phosphodiesterase (PDE) activity ($p<0.01$) only with 8 mM DC (to 184.0 pmol/mg/min versus 240.3 pmol/mg/min for controls). Dibutyryl cAMP also produced significant ($p<0.01$) colonic loop secretion (1.58 ml/cm) when compared to controls. It is concluded that the cAMP system is strongly implicated in the mechanism of DCA stimulation of colonic secretion. This mechanis may be operative in the pathogenesis of bile acid-induced diarrhea in man.

7861 ION TRANSPORT CHANGES DURING CALCITONIN-INDUCED INTESTINAL SECRETION IN MAN.

(Eng.) Gray, T. K.; Brannan, P.; Juan, D.; Morowski, S. G.; Fordtran, J. S. (Univ. Texas Health Science Center, Southwestern Medical Sch., Dallas, TX). *Gastroenterology* 71(3):392-398; 1976.

Water and electrolyte secretion by the jejunum and ileum were studied in normal human volunteers during i.v. infusion of synthetic salmon calcitonin (SCT) or synthetic human calcitonin (HCT). At 0.5 μg/kg/hr, HCT reduced water and electrolyte absorption rates by the jejunum, but only the change in potassium absorption was significant ($p=0.025$). At 1.0 and 2.5 μg/kg/hr, the secretion of water and elec-

:olytes was approximately equal. The serum calcium oncentration did not significantly change during ny of the infusion rates. At 1 μg/kg/hr, HCT did ot significantly alter the potential difference beween peripheral venous blood and luminal contents. uring the infusion, sodium and chloride were secreted nto the jejunal lumen; the chloride secretion was gainst an electrochemical gradient. The rate of ater and electrolyte absorption by the jejunum was educed during infusion of SCT when the lumen conained glucose (100 mM), but secretion was not inuced. In the ileum, SCT infusion caused the secreion of water, sodium, potassium, chloride, and icarbonate. In the jejunum, SCT infusion reduced he net sodium absorption by reducing the flux rate f sodium out of the lumen. In the ileum, the change rom net sodium absorption to net sodium secretion as almost entirely the result of a reduction in the lux out of the lumen, from 27.5 to 15.8 mEq/hr/30 cm. here was no significant change in the sodium uniirectional flux rate into the lumen. In most cases, CT caused a fall in the pCO_2 of the luminal contents ollected from the distal end of the test segment hen infusion solutions contained bicarbonate. Arerial pCO_2 did not change. It is concluded that alcitonin induces active chloride secretion and inibits active sodium absorption and that bicarbonate bsorption is reduced by virtue of secretion of hyroxyl ions. Since higher than physiological levels f calcitonin were required for induction of intestinl secretion, calcitonin probably does not mediate pontaneous variations of intestinal transport in ormal individuals. It may be a cause of severe ecretory diarrhea in certain disease states (medulary carcinoma of the thyroid) associated with high lasma calcitonin concentrations.

'862 EFFECT OF PENICILLIN ON THE SUCCESSION, ATTACHMENT, AND MORPHOLOGY OF SEGMENTED, 'ILAMENTOUS MICROBES IN THE MURINE SMALL BOWEL.

Eng.) Davis, C. P.; Savage, D. C. (Dept. Medical licrobiology Surgery, Univ. Wisconsin, Madison, WI 53706). *Infect. Immun.* 13(1):180-188; 1976.

The attachment and morphology of a segmented filamentous prokaryote found in the murine small bowel were studied by scanning electron microscopy, and the effects of penicillin on the colonization, morphology, and attachment of these microbes were studied with scanning, transmission, and light microscopy. C57Bl/6St Crl Br and COBS CD-1 (ICR) BR mice and ARS/Sprague-Dawley rats were used. In the mice, many microbes were attached to the epithelial villous cells near the ileocecal valve. There are few microbes in the proximal ileum, and none of the animals showed any microbes on jejunal pieces taken within 8 cm of the pyloric sphincter. The length of the microbes varied from about 1 to 100 cm. About twothirds of the length of the distal villi of both mice and rats was populated by the microbes. Although disruption of the microvillus border was observed in the immediate area of attachment, the great majority of microvillus borders were intact in both mice and rats. Microbes were attached to exfoliating epithelial cells. They were not found in any of 20 mice that received penicillin (0.6 g/l) in the drinking water for 7 days or in any of 50 animals treated with penicillin and then given acidified water (0.001 HCl) for 17 days. Recolonization occurred 32-35 days after the penicillin treatment was stopped. In animals fed an ileal homogenate 18 days after penicillin treatment, recolonization occurred about 28 to 32 days after penicillin treatment ended. Within 3-5 hr after rats were given penicillin, the morphology of the microbes was changed. Their external surfaces were wrinkled or broken, and vacated and partially vacated attachment sites were observed. Almost all organisms disappeared from murine ilea within 10 hr of penicillin treatment. Removal of the attachment site and resynthesis of lumenal membrane microvilli by the epithelial cells were suggested by the presence of Golgi and membranebound vesicles adjacent to the attachment site. It seems likely that the epithelial cells replace the attachment site with either lumenal membrane or microvilli or both.

7863 THE EFFECTS OF SODIUM RICINOLEATE ON SMALL INTESTINAL FUNCTION AND STRUCTURE. (Eng.)

Cline, W. S.; Lorenzsonn, V.; Benz, L.; Bass, P.; Olsen, W. A. (Gastroenterology Res. Lab., Madison Veterans Admin. Hosp., Madison, WI 53706). *J. Clin. Invest.* 58(2):380-390; 1976.

Sodium ricinoleate-induced secretion was investigated *in vivo* in the perfused small intestine of male Syrian Golden hamsters. At 8 mM, ricinoleate resulted in secretion of water and Na ($p<0.01$ compared to controls), a 12-fold increase in intestinal clearance of inulin, and a less-striking but significant enhancement of dextran clearance. At 2 mM, ricinoleate did not affect water or Na transport or alter intestinal permeability. Ricinoleate-induced intestinal secretion was also accompanied by a threefold increased mucosal cell exfoliation, as measured by the appearance of DNA in the perfusate, and by apparent injury to epithelial cell membranes, as judged by measurement of sucrase activity and phospholipid in cell-free aliquots of luminal fluid. Light and electron microscopy demonstrated that 8 mM ricinoleate caused substantial mucosal architectural changes, villus shortening, and injury to epithelial cells at the villus tips. In contrast, cholera enterotoxin caused marked secretion of Na and water, presumably by a cyclic AMP mechanism, but did not alter inulin clearance or enchance DNA or sucrase appearance in the lumen. These studies suggest that at least a component of ricinoleateinduced intestinal secretion is related to structural alterations of the mucosa.

7864 EFFECT OF TRIIODOTHYRONINE ON HUMAN JEJUNAL GLYCOLYTIC ENZYMES. (Eng.)

Lufkin, E. G.; Taunton, O. D.; Stifel, F. B.; Hofeldt, F. D.; Wrensch, M. R.; Hagler, L.; Herman, R. H. (Mayo Graduate Sch. Medicine, Rochester, MN 55901). *Proc. Soc. Exp. Biol. Med.* 150(2):410-413; 1975.

To determine the effect of thyroid hormone on human intestinal enzymes, four normal and three hypothyroid men received tri-iodothyronine (T_3, 100 μg/8 hr, p.o.) together with different carbohydrate diets. The carbohydrate-free diet contained 70% of the calories as fat and 30% as protein and was given during periods 2 and 6 (covering 3 days) of the study. Glucose and fructose diets, with 50% of the calories as sugar, 30% as fat, and 20% as protein, were given during periods 3 and 7 (3 days) and 4 and 8 (3 days) of the study, resp. During periods 1 and 5 (1 day), the subjects fasted. T_3 was given during periods 5-8. In the normal subjects, pyruvate kinase, fructose-1-phosphate aldolase, and fructose-1,6-diphosphate aldolase showed adaptive increases in activity as the diet was sequentially changed from fasting to carbohydrate-free, glucose, and fructose. The opposite effect was seen for fructose diphosphatase, whose activity was highest with fasting, declined with the carbohydrate-free and glucose diets, and was intermediate with the fructose diet. T_3 caused increased jejunal pyruvate kinase and decreased fructose diphosphatase activity during the fasting, carbohydrate-free, and glucose diets, compared to these same periods without T_3. T_3 showed no interaction with the dietary effect on these enzymes during fructose feeding. Fructose-1,6-diphosphate aldolase and fructose-1-phosphate aldolase were decreased during fructose feeding and T_3 administration. These results indicate that T_3 interacts with dietary carbohydrates to affect human jejunal glycolytic and gluconeogenic enzyme activities. In the hypothyroid men, pyruvate kinase activities were decreased and fructose diphosphatase activities were increased during the administration of all diets. T_3 restored enzyme activities to normal only occasionally.

7865 INFLUENCE OF STAPHYLOCOCCAL ENTEROTOXIN ON WATER AND ELECTROLYTE TRANSPORT IN THE SMALL INTESTINE.

(Eng.) Elias, J.; Shields, R. (Dept. Surgery, Univ. Liverpool, Liverpool, England). *Gut* 17(7):527-535; 1976.

The direct and indirect effects of staphylococcal enterotoxins A and C on the flux of water, sodium, and potassium were studied in paired jejunal or ileal Thiry-Vella fistulae in dogs. When the two toxins were studied separately, they produced responses that were not significantly different; thereafter, the toxins were pooled and studied together. After the administration of toxin in the jejunum, the net absorption rates of water and sodium were reduced from initial mean values of 2.7 ml/10 min and 457 μEq/10 min, resp., to values of 0.6 ml/10 min and 100 μEq/10 min, resp. There was a net secretion of potassium (1 μEq/10 min) after the administration of toxin, whereas potassium was absorbed at a rate of 7 μEq/10 min before this. The mean rate of water movement out of the lumen was 10.4 ml/10 min, and 7.6 ml/10 min into the lumen. The mean flux of sodium out of the lumen was 951 μEq/10 min, and 490 μEq/10 min, into the lumen. The mean potassium flux was 26 μEq/10 min out of the lumen, and 18 μEq/10 min into the lumen. After the administration of toxin, the mean fluxes out of the lumen were significantly lower (7.6 ml/10 min, 601 μEq/10 min, and 19 μEq/10 min for water, sodium, and potassium, resp.), whereas the fluxes into the lumen for each substance were not significantly changed. Similar results were obtained in the ileum. Lower doses of toxin (5 and 10 μg) did not produce as marked an effect on net transport and flux as did higher doses (20, 40, and 80 μg), but otherwise the influence of toxin on absorption was not dose-related. Absorption tests were carried out in a single loop into which either toxin or control solution had been instilled, and in the paired fistula to determine if enterotoxin could affect absorption elsewhere in the intestine. The effect of enterotoxin on the remote intestine was demonstrated, and this effect was more obvious in the ileum than in the jejunum. The local response was greater than that produced at a distance. These observations suggest that the main action of the enterotoxin is a direct one upon the bowel to which it is applied.

7866 FUNCTIONAL AND METABOLIC CHANGES OF THE MUCOSA DURING OBSTRUCTION OF THE SMALL INTESTINE OF THE RAT.

(Ger.) Merkle, P.; Bindewald, H.; Breitig, D. (Abteilung fur Allgemeine Chirurgie der Universitat, D-900 Ulm-Safranberg, Steinhovelstr. 9, W. Germany). *Langenbecks Arch. Chir.* 338(4):291-297 1975.

The pathogenesis of restricted absorption in the obstructed small intestine is examined. The small bowel of fasted male SPF Wistar rats was ligated behind the ligament of Treitz, and the absorption of ^{14}C-glucose and ^{3}H-antipyrine (TAT) mucosal ultrastructure, and enzyme activity were measured. Postsurgical survival was 80% at 48 hr. The experimental group (EG) displayed cloudy intraperitoneal exudate, distension of the proximal gastroduodenum, and hypoxia of the distal bowel. After 24 hr, 35% of the ^{3}H-antipyrine had been absorbed by the test group (the value was 57% for the control group), and after 48 hr, 32% had been absorbed (the value was 62% for the control group). After 24 hr, 57% of the glucose was absorbed by the test group (the value was 70% for the control group), and after 48 hr, 35% had been absorbed (the value was 67% for the control group). At 48 hr, the activities of sorbitol dehydrogenase and SGOT were diminished to 0.78 and 154 mU/mg protein compared to 0.9 and 191.7 in the control group. Glucose-6-phosphate dehydrogenase and LDH increased to 34.1 and 2,895 mU/mg protein, resp., in the test group, compared to 25.5 and 2,227 in the control group at 48 hr. The LDH difference is significant at $p<0.05$. The tissue lactate level in the test group was three times higher than that in the control group at 24 hr and at 48 hr; the lactate/pyruvate quotient in the test group was 46 at 24 hr (controls=20) and 44 at 48 hr (controls=17). Sucrase remained unchanged throughout. Maltase was diminished in U/g protein, at 24 and 48 hr in the test group to 298 and 317, resp., compared to control group values of 434 and 358. Alkaline phosphatase in the test group rose negligibly at 24 hr and then fell significantly ($p<0.05$) after 48 hr to 875 U/g protein compared to 1,523 for the control group. Electron microscopy revealed the brush border to be intact. At 48 hr postileus, the mitochondria were generally either deformed or swollen. The hypoxia-induced absorptive changes elicited no significant structural modification, not even signs of ischemia, suggesting that the sequelae of occlusion are reversible.

7867 DISACCHARIDASES TOTAL ACTIVITY IN THE SMALL BOWEL OF RATS SUBMITTED TO EXPERIMENTAL PROTEIN DEFICIENCY. (Por.) Brasil, M. R. L.; Collares, E. F.; Soares, F. C.; Woiski, R. J. (Hospital das Clinicas, 14100 Ribeirao Preto, Sao Paulo, Brazil). *Arq. Gastroenterol.* 12(3):165-170; 1975.

7868 TOTAL AND SPECIFIC ACTIVITY OF LACTASE, INVERTASE AND MALTASE IN THE SMALL BOWEL OF MALNOURISHED RATS. (Por.) Soares, F. C.; Collares, E. F.; Brasil, M. R. L.; Woiski, J. R. (Faculdade de Medicina, Universidade de Sao Paulo, 14100 Ribeirao Preto, Brazil). *Arq. Gastroenterol.* 12(3):171-177; 1975.

7869 THE DEPRESSOR EFFECT OF DOPAMINE ON THE ELECTRICAL AND MECHANICAL ACTIVITIES OF CAT SMALL INTESTINE. (Eng.) Ohkawa, H.; Watanabe, M. (Yamaguchi Univ. Sch. Medicine, Ube, Japan). *Tohoku J. Exp. Med.* 117(1):69-77; 1975.

See also, 7683, 7701, 7706, 7819, 7875, 7880, 8360.

GENERAL

7870 EFFECTS OF ANESTHETICS ON SPLANCHNIC CIRCULATION AND METABOLISM. (Eng.) Batchelder, B. M.; Cooperman, L. H. (Univ. Pennsylvania Sch. Medicine, 3400 Spruce St., Philadelphia, PA 19104). *Surg. Clin. North Am.* 55(4):787-794; 1975.

The normal physiology of splanchnic blood flow, the measurement of hepatic blood flow (HBF), the HBF response to specific physiologic alterations, anesthetic effects on splanchnic blood flow, and the metabolic effects of altered splanchnic blood flow are discussed. In most studies of anesthetic effects on splanchnic perfusion, the HBF is estimated by measuring hepatic clearance of intravascular indocyanine green. Anesthetized patients often receive vasoactive drugs, which may alter the HBF. Alpha stimulators such as methoxamine and norepinephrine increase systemic blood pressure, but reduce HBF, as does beta blockade with propranolol. Other factors that may alter the HBF include uncontrolled hemorrhage, visceral traction during laparotomy, and hypoventilation with carbon dioxide retention. Respiration also interferes periodically with splanchnic venous outflow, and this effect is further accentuated by anesthesia. Cyclopropane and methoxyflurane reduce the splanchnic blood flow to about half that of controls, and also produce increased splanchnic vascular resistance. Halothane also decreases splanchnic blood flow, but does not change splanchnic vascular resistance. Nitrous oxide has no inherent effect on splanchnic vascular resistance or blood flow, even when combined with thiopental, muscle relaxants, and controlled ventilation at "normal" volumes. Like the general anesthetics, both spinal and lumbar epidural analgesia impair HBF. Anesthetic techniques with high ratios of splanchnic flow to oxygen consumption should be used in anesthetized patients with conditions reducing the availability of oxygen to the liver, but there is no clear evidence that any anesthetic causes harm in healthy persons.

7871 PERITONEAL EXUDATE CELLS. III. EFFECT OF GAMMA-IRRADIATION ON MOUSE PERITONEAL COLONY-FORMING CELLS. (Eng.) Lin, H.-S. (Washington Univ. Medical Sch., St. Louis, MO 63110). *Radiat. Res.* 63(3):560-566; 1975.

The effect of *in vivo* and *in vitro* gamma-irradiation on the proliferative capacity of mouse peritoneal exudate colony-forming cells (PCFC) was studied, and the dose-response curve of PCFC to irradiation was compared to that of bone marrow hemopoietic colony-forming units in culture (CFU-C). The recovery of the inducibility of PCFC by thioglycollate medium after whole-body irradiation was also investigated. PCFC was obtained and pooled 3 days after C3H/He mice received an i.p. injection of thioglycollate medium (1.5 ml). These cells were irradiated *in vitro* (0-600 rads), and a mean D_0 value of 110 rads was obtained. When irradiation was carried out *in vivo*, the D_0 value was similar (118 rads). When the dose-response curves of bone marrow hemopoietic CFU-C to gamma-irradiation (0-700 rads) *in vivo* and *in vitro* were constructed, the *in vivo* D_0 value was 124 rads, and the *in vitro* D_0 value was 135 rads. Four days after mice were whole-body irradiated with 200 rads, there was a rapid initial recovery of the inducibility by thioglycollate medium of PCFC formation; this was followed by a marked depression in the number of colony-forming cells. The levels returned to near control values at day 17. The data suggest that the sensitivity of PCFC to irradiation *in vitro* and *in vivo* is almost identical and that both PCFC and bone marrow CFU-C have a similar sensitivity to gamma-irradiation.

7872 ASSOCIATION OF SALMONELLA MUTANTS WITH GERMFREE RATS: SITE SPECIFIC MODEL TO DETECT CARCINOGENS AS MUTAGENS. (Eng.) Wheeler, L. A.; Carter, J. H.; Soderberg, F. B.; Goldman, P.

(Harvard Medical Sch., Boston, MA 02215). *Proc. Natl. Acad. Sci.* 72(11):4607-4611; 1975.

A site-specific model to detect carcinogens as mutagens is described. An association of the histidine auxotroph of *Salmonella typhimurium* (strain TA1538) within the gastrointestinal tract of otherwise germ-free Sprague-Dawley rats is maintained during periods of observation lasting as long as 7 months. The bacteria were found at levels exceeding 10^7/g in the forestomach and at levels greater than 10^8/g in the lower bowel and in the feces. Approximately 10^4 bacteria per gram were found in the posterior stomach and in the upper small intestine. The association of the salmonella mutants was maintained when the bacterial association was increased by the addition of other bacteria characteristic of the gastrointestinal flora. Carcinogenic amines, which cause strain TA1538 to revert to histidine independence in Ames' *in vitro* assays, increased the number of revertants in the feces when fed to the salmonella-associated rats. In contrast, the number of revertants in the feces did not increase when the rats were fed structurally related compounds that were not mutagenic to the bacteria *in vitro* and for which no evidence of carcinogenicity exists. Sacrifice of rats after feeding of 2-nitrofluorene indicated that the number of revertants was increased in the cecum and colon as well as in the feces. The apparent proximity of the bacterial mutagenic response to the location of the tumor response in the colon suggests that the rat associated with the histidine auxotroph may provide a useful model for further investigation of the possible association between bacterial mutagenesis and carcinogenesis within the gastrointestinal tract. In addition, with this model it may be possible to selectively evaluate the effects of various constituents of the flora on the activation of compounds provoking the revertant response.

7873 SOLUTION PROPERTIES OF SULFOBROMOPHTHALEIN SODIUM (BSP) COMPOUNDS ALONE AND IN ASSOCIATION WITH SODIUM TAUROCHOLATE (TC). (Eng.) Ware, A. J.; Carey, M. C.; Combes, B. (Univ. Texas Southwestern Medical Sch., Dallas, TX 75235). *J. Lab. Clin. Med.* 87(3):443-456; 1976.

The colloid-chemical characteristics of various BSP compounds in aqueous solution were studied, and the possibility of a direct physiochemical interaction between BSP and taurocholate (TC) was evaluated. These *in vitro* studies utilized the techniques of ultracentrifugation, freezing point depression, vapor pressure osmometry, and spectrophotometry. BSP compounds were found to self-associate in aqueous solution to form polymolecular aggregates. These aggregates were larger with unconjugated BSP, where the aggregation number apparently increased with the concentration of BSP, compared with the more polar glutathione conjugate of BSP. There was a marked physicochemical interaction between unconjugated BSP and TC and a much smaller effect between the bile salt and conjugated BSP. This interaction was minor between BSP and glycodeoxycholate or taurodehydrocholate, but was reproduced fully by glycocholate. Such an interaction between BSP and TC may have physiologic importance and may help to explain the previously noted facilitated excretion of BSP observed after infusion of TC in experimental animals.

7874 INVESTIGATIONS INTO THE METABOLISM AND MODE OF ACTION OF THE COLON CARCINOGEN 1,2-DIMETHYLHYDRAZINE. (Eng.) Fiala, E. S.; (Naylor Dana Inst. Disease Prevention, Valhalla, NY 10595). *Cancer* 36(6):2407-2412; 1975.

Chromatographic methods that allow the separation and identification of azomethane (AM), azoxymethane (AOM), and methylazoxymethanol (MAM) were applied to the analysis of bile, urine, and the exhaled air of male Fischer rats treated with ^{14}C-labeled 1,2-dimethylhydrazine (DMH) to test the hypothesis that AM, AOM, and MAM are metabolites of DMH. Investigations of the metabolism and mode of action of DMH and its derivatives by other workers are briefly reviewed. AOM and MAM were found in the pooled bile of animals injected 4 hr previously with ^{14}C-DMH and in the urine of animals injected 5-6 hr previously. AM was detected in the exhaled air of DMH-treated animals. DMH was administered to rats maintained on a semisynthetic diet containing either no additives or phenobarbital, β-naphthoflavone, or chrysene. Phenobarbital increased the multiplicity of colon adenocarcinomas, while chrysene appeared to cause a decrease in these lesions in DMH-treated rats. β-Naphthoflavone increased the multiplicity of colon adenomas over controls. The results indicate that the three microsomal enzyme inducers may have a differential effect on the reactions in the activation pathway of DMH.

7875 PERMEABILITY OF THE SMALL INTESTINE AFTER INTRA-ARTERIAL INJECTION OF HISTAMINE-TYPE MEDIATORS AND IRRADIATION. (Eng.) Kingham, J. G. C.; Loehry, C. A. (Royal Victoria Hosp., Boscombe, Bournemouth, England). *Gut* 17(7):517-526; 1976.

Permeability and selectivity of rabbit small intestine were estimated by a perfusion technique after intra-arterial injection of histamine-type mediators and intestinal irradiation. The injection of either histamine acid phosphate (0.5 mg/ml) or bradykinin triacetate (0.1 mg/ml) over a 20-min period caused a moderate increase in overall mucosal permeability concomitant with an increase in capillary permeability. The clearances of ^{125}I-polyvinylpyrrolidone (PVP), ^{3}H-inulin, ^{57}Co-vitamin B_{12}, and creatinine from plasma to intestinal lumen were increased by 290%, 190%, 120%, and 80%, resp., after the administration of histamine. The only other tracer substance used, urea, was unaffected by histamine. The clearance curves of the histamine- and bradykinin-treated loops were much flatter than the control curves, denoting a marked loss of selectivity; the slopes of the curves for histamine, bradykinin, and control were 0.021, 0.020, and 0.033, resp. Light microscopic examination of control and histamine-treated loops, stained with neutral red to show i.v.-injected carbon particles, showed an increase in capillary permeability without obvious changes in the epithelium or its basement membrane. Gamma irradiation (1,500 rads) of the intestine produced increases in the clearances of PVP

l,120%), inulin (920%), vitamin B_{12} (780%), and
reatinine (140%). Thus, the larger the molecular
eight of the tracer substance, the greater was the in-
rease in its permeation rate. The loss of selectivity
as confirmed by fractionation of the PVP; the slope
f the clearance curve of the irradiated loop was much
ess steep than that of the control curve. The authors
elieve that the loss of selectivity was partly due to
n increase in capillary permeability, but was largely
ue to damage to the epithelial basement membrane.
t is concluded that the intestinal capillary endothel-
um is both rate-limiting and selective, although not
o a major degree in either case. The epithelial base-
ent membrane, however, appears to be both rate-lim-
ting and markedly selective.

876 THE CONSEQUENCES OF ISCHAEMIA AFTER MECHANICAL OBSTRUCTION OF THE DOG ILEUM.

Eng.) Mirkovitch, V.; Robinson, J. W. L.; Menge,
.; Cobo, F. (Centre Hospitalier Universitaire Vaudois,
H-1011 Lausanne, Switzerland). *Res. Exp. Med. (Berl.)*
68(1):45-55; 1976.

xperiments were carried out in dogs to determine the
ffects of ischemia after mechanical ileal obstruction,
nd to determine whether the atrophic mucosae in the
oops below the obstruction still possessed the regen-
rative force to cope with the ischemic injury. A
echanical obstruction was produced in the ileum, and
days later, loops of intestine above and below the
cclusion were subjected to ischemia for 1 hr. This
ed to widespread morphological and functional damage
f the epithelium, indistinguishable from the response
f normal intestine. The damage consisted of de-
quamation of the epithelium and the lamina pro-
ria from the villus tips, extravasation of RBC,
isintegration of the pericryptal connective tis-
ue, complete loss of ability to absorb amino
cids or monosaccharides against a concentration grad-
ent *in vitro*, an increase in tissue water and extra-
ellular space, decreases in oxygen consumption, and
ncreases in acid phosphatase release. The recovery
f the mucosa of both loops 1 day after ischemia fol-
owed the same pattern as when no occlusion was super-
mposed. The mucosa above the obstruction had smaller
illi, shorter crypts, and smaller epithelial cells
han the contiguous untouched tissue, but the degree
f recovery was the same in normal loops, and the
oops above and below the obstruction. The transport
f phenylalanine had normalized in the ischemic loops
nd in normal tissue by the first day after ischemia,
hile that of β-methyl-glucoside remained depressed.
xygen consumption and lactate production also remain-
d depressed. The results suggest that the regenera-
ive potential of the crypts could not be obliterated
y 1-hr ischemia, either in the presence of a noxious
bstruction fluid above the occlusion or in the atro-
hic mucosa below it.

877 PATHOPHYSIOLOGY OF INTESTINAL ISCHEMIA AND ITS HEALING PROCESS.

(Eng.) Hayashi, S.;
giwara, M.; Numata, M. (Dept. Surgery I, Shinshu
niv., Matsumoto-shi, Nagano-ken, Japan). *Chir.
astroenterol.* 9(3):343-353; 1975.

The pathophysiology of intestinal ischemia and its healing process was studied in dogs with experimental ischemia, and the clinical findings in nine patients with intestinal ischemia are presented. Among the nine patients with mesenteric infarction, two were successfully treated by bowel resection. Thrombectomy or embolectomy was attempted in two other patients, but they died from massive intestinal infarction caused by occlusion of the superior mesenteric artery (SMA). In the dogs, the bowel was made ischemic by clamping the proximal SMA for 0.5-4 hr. The blood 5-hydroxytryptamine (5-HT) levels were increased during ischemia. In dogs that experienced bowel ischemia for up to 3 hr, the 5-HT levels returned to control levels after the clamp was removed; these dogs also recovered from shock. Dogs that experienced ischemia for 4 hr remained in shock, and the 5-HT levels remained high until death. Dogs that were ischemic for 30-45 min survived until the time of sacrifice, which was up to 20 days following the induction of ischemia. Five of 15 dogs that underwent ischemia for 50 min died within 3 days after the clamp was released, and four of the remaining animals had diarrhea. Twelve of 14 dogs that were ischemic for 60-90 min died within 4 days. The most significant pathological changes in the middle portion of the small intestine were found in the dogs that underwent ischemia for 50 min or more. Shallow ulceration, epithelial degeneration, and vasodilatation were observed 4 days after the dogs underwent 50-min ischemia. In dogs ischemic for 30-45 min, the hexosamine concentrations increased in both the mucosa and muscle layer 4-6 days after the restoration of mesenteric flow. The hydroxyproline concentration was also increased at 10 days after the restoration of mesenteric flow. Three dogs in which experimental SMA stenosis to one-fourth of the original caliber had been produced died from massive bowel necrosis within 3 days of the operation; three of nine dogs with stenosis of one-third the original caliber died within 10 days. However all of 16 dogs with stenosis of one-half the original caliber survived the operation. Although clinical cases may tolerate longer periods of intestinal ischemia, early diagnosis, immediate laparotomy with an adequate therapeutic technique (i.e., meticulous vascular surgery and bowel resection), and various supportive therapy are necessary.

7878 ACUTE ISCHEMIC CHANGES IN INTESTINAL MUSCULARIS.

(Eng.) Ming, S.-C.; McNiff, J. (Dept. Pathology, Temple Univ. Medical Sch., 3400 Broad St., Philadelphia, PA 19140). *Am. J. Pathol.* 82(2):315-326; 1976.

The morphologic alterations in the mouse intestinal muscularis occurring within 24 hr of ischemia were investigated. Ischemia of the small bowel was produced in 12 mice, and 15-120 min after onset, the intestinal wall at the midpoint of the ischemic segment was excised. Since the mice did not survive beyond 2 hr, ischemic effects from 2-24 hr were studied *in vitro*. The ischemic muscle cells in both circular and longitudinal layers showed progressively severe alterations with time. Ultrastructural changes were evident at 15 min. Within 1 hr, three prominent changes occurred: contraction of cells, unevenness of the sarcoplasmic density, and markedly increased dense patches with focal enlargement of cell diameter. After 2 hr, the cells were irregular in both size and shape. An increasing degeneration and lysis of myofilaments resulted in dense degenerative bands and nodules alternating with clear segments. By 4 hr, the myofilaments disintegrated. The mitochondria were condensed, shrunken, and fragmented. By 8 and 24 hr, there was total destruction of the cells, with only irregular patches of amorphous granular material remaining. The plasma membrane had largely dissolved and the intercellular space could no longer be recognized. Nuclei had disappeared from many cells. The profound derangement of myofilaments offers a morphological basis for the decrease of electrical slow waves and loss of tone in the ischemic bowel muscle of experimental animals and man.

7879 DIGESTIBILITY OF PROTEIN AND DRY MATTER IN CAECECTOMISED AND INTACT RATS.

(Eng.) Dreyer, J. J.; Concannon, T. R. J.; De Klerk, W. A. (National Food Res. Inst., CSIR, Pretoria, South Africa). *S. Afr. Med. J.* 49(40):1661-1666; 1975.

To determine the effect of the microbial activity in the cecum on total dry matter digestibility (DMD) and on protein digestibility, cecectomized and intact rats were studied. The DMD of uncooked maize and the digestibility of the protein in cooked methionine-supplemented yellow haricot beans were determined. Cecectomized and intact rats received a diet containing 0, 250, 500, 750, or 1,000 g of maize meal or a diet containing 179, 448, 717, 985, or 1,254 g of methionine-fortified yellow haricot beans (1.20, 1.68, 2.16, 2.63, or 3.16% N, resp.). The mean maize DMD levels in intact and cecectomized rats were 99% and 90%, resp. The methionine-supplemented bean protein was 77.7% digestible in intact rats and 79.9% digestible in cecectomized animals. These results suggest that microbial activity causing gas formation in the cecum results in an appreciable loss of dry matter, but that the presence of the cecum does not affect protein digestibility.

7880 THE INFLUENCE OF A CHEMICAL DIET ON THE INTESTINAL MUCOSA AFTER JEJUNO-ILEAL BYPASS IN THE RAT.

(Eng.) Fenyo, G.; Hallberg, D. (Surgical Res. Lab., Karolinska sjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 142(3):270-274; 1976.

The role of diet in stimulating compensatory hypertrophic changes in the intestine was investigated in rats after jejuno-ileal bypass surgery to exclude about 85% of the small intestine. One group of rats was fed pellet food *ad libidum,* and the other was fed 27 g of a chemically well-defined diet (Vivasorb) daily, to give the least possible intraluminal stimulus with full nourishment. Control sham-operated animals were also maintained in each of the two diets. Intestinal biopsy was carried out after 2 weeks, at which time the sham-operated pellet group had gained 7% in body weight, the shunt-operated pellet group had lost 8.9%, the sham-operated Vivasorb group had gained 4.6%, and the shunt-operated Vivasorb group had lost 27%. The functioning part of the jejunum and ileum in both shunted groups became hypertrophic, while the bypasse portion became atrophic and narrow. Water evaporatio was measured in 3-cm segments taken from various portions of the intestine. Shunt-operated animals had a significantly higher percentage of water evaporation than controls, regardless of diet ($p < 0.05$ for pellets and $p < 0.001$ for Vivasorb). Wet and dry weights of i testinal segments from pellet-fed shunted animals wer significantly higher than those from sham-operated an mals. In the Vivasorb animals, similar increases in dry and wet weights were observed, except in the bli loop of shunted animals where significant atrophy was noted. Among sham-operated animals, the Vivasorb gro had a significantly lower intestinal weight, except f the most proximal segment. Among shunted animals, th pellet group had a higher weight increase (wet and dry) than the Vivasorb group. In shunted pellet-fed animals, villus height was significantly increased, except in the blind loop. In shunted Vivasorb-fed an imals, villus height was significantly increased, except in the blind loop where significant atrophy was observed. In shunt-operated animals, the pellet diet was superior to Vivabsorb for inducing an increase in villus height. It is concluded that a chemically defined, virtually bulk-free diet is capable of stimula ting the mucosa of the small intestine to develop compensatory adaptive changes.

7881 ADRENERGIC INFLUENCES ON THE ELECTRICAL POTENTIAL ACROSS THE COLONIC MUCOSA OF THE RABBIT.

(Eng.) Lennane, R. J.; Peart, W. S.; Shaw, J. (St. Mary's Hosp. Med. Sch., Univ. London, London, W21PG, England). *J. Physiol.* 250(2):367-372; 1975.

The role of adrenergic changes in the transient increase in potential difference (PD) seen in the colonic mucosa of rabbits subjected to handling and restraint was studied. In 20 normal rabbits, the mean colonic PD, which was 9.45 mV before the experiment, rose to 27.04 mV 2 hr after the animals were wrapped in a drape and restrained. Four hours after the animals were unwrapped and returned to their cages, the PD had returned to 11.3 mV. Adrenalectomy did not significantly alter the response to handling. Adrenergic block was produced by the administration of pentolinium (50 mg, i.v.) to normal or adrenalectomized rabbits or the administration of guanethidine (12.5 mg/kg 1 day for 3-5 days, i.v.) to adrenalectomized rabbits. Adrenergic block abolished the response to handling; the initial mean PD of 13.3 mV fell in all six animals tested to 9.67 mV 2 hr after handling. After α-adrenergic block by the i.v. infusion of phenoxybenzamine (6 mg/kg, over 20-30 min), the initial mean colonic PD of 17.5 mV rose to 28.4 mV following handling. In animals that received propranolol (0.4 mg/kg/10 min, i.v.) to achieve β-adrenergic block, the initial PD of 11.4

mV decreased to 8.70 mV after handling. In animals that received neosynephrine (0.6 μg/kg/min, 2 hr), an α-adrenergic agonist, the initial colonic PD of 5.50 mV increased to 11.8 mV. β-Adrenergic stimulation with isoproterenol sulphate (0.1 μg/kg/min, 2 hr) resulted in an increase in PD from an initial value of 7.36 mV to 43.1 mV after handling. The administration of atropine sulphate (3 mg followed by 0.1 mg/kg/min continuous infusion) did not change the response to handling seen in untreated animals. The results indicate that the change in colonic PD with handling is a direct effect of the autonomic nervous system mediated via β-receptors and that the changes are not related to the effects of circulating catecholamines or to changes in aldosterone production.

7882 HEPATITIS TRANSMISSION IN MARMOSETS.

(Eng.) Appleton, H. (Central Public Health Lab., Colindale Ave., London NW9 5HT, England). *J. Infect. Dis.* 132(5):500-505; 1975.

The suitability of marmosets for hepatitis studies was assessed. Because the relationship of two sera (Barker and Berlin strains) to human hepatitis is uncertain, an attempt was made to establish a new strain by the direct inoculation of sera from patients with infectious hepatitis. Abnormal transaminase activity occurred in 75% of 44 animals originally inoculated with the Barker agent, but when histological and biochemical results were considered together, a positive diagnosis of hepatitis was made in only 41%. No difficulty was experienced in the transmission of the Berlin agent to marmosets; five of six animals developed hepatitis following inoculation. Normal human immunoglobulin failed to protect against infection with the Berlin agent. Animals that had been successfully infected with the Barker agent failed to develop hepatitis on subsequent challenge with the Berlin agent. Animals that had been resistant to infection with the Barker agent also resisted infection when later challenged with the Berlin agent. Four hepatitis B surface antigen-free serum pools were prepared from patients with acute infectious hepatitis. Although some animals injected with one of the first three pools developed raised SGOT levels, attempts to passage the agent were unsuccessful. Hepatitis B surface antigen-positive serum, obtained from a patient with chronic hepatitis, also did not induce hepatitis in marmosets, and neither antigen nor antibody was detected in these animals. The authors conclude that more reliable and consistent results would be obtained from marmosets from a successful breeding colony, rather than from wild marmosets.

7883 HISTOLOGICAL AND CYTOLOGICAL STUDIES ON HEPATOCARCINOGENESIS IN RATS BY ADMINISTRATION OF DIETHYLNITROSAMINE.

(Eng.) Takayama, S.; Hitachi, M.; Yamada, K. (Dept. Experimental Pathology, Kami-Ikebukuro 1-37-1, Toshima-ku, Tokyo 170, Japan). *Gann Monogr. Cancer Res.* 17:343-354; 1975.

The histological and cytological changes associated with diethylnitrosamine-induced hepatocarcinogenesis were studied in male Donryu rats. The rats received 50 ppm of diethylnitrosamine (DEN) in the drinking water for 2, 3, or 4 weeks. The first liver tumor was found in a rat sacrificed during the 34th week that had been fed DEN for 2 weeks. In the group fed DEN for 2 weeks, liver tumors were found in 3 of 24 rats killed up to 78 weeks. In the animals fed for 3 weeks, liver tumors were found in 14 of 32 rats killed up to 59 weeks, and in the animals fed for 4 weeks, tumors were found in 9 of 20 rats killed up to 44 weeks. In animals that received 50 ppm DEN for 3 weeks, areas of hyperplasia were observed in the liver immediately after the end of DEN administration. Nodular hyperplasia was seen after 14 weeks, and liver tumors occurred after about 30 weeks. Four weeks after DEN administration was discontinued, the incidence of near-triploid and tetraploid cells was 22.2%, and 8 weeks after discontinuation, the incidence was 20.5%. By 20 weeks, the incidence of abnormal chromosomes had decreased to 8.8%. A large number of the dividing cells in the DEN-induced liver cell carcinomas were chromosomally abnormal diploid cells. The authors conclude that the observed cytogenetic changes are relevant to the subsequent development of tumors.

7884 AN ANTIGEN COMMON TO PRENEOPLASTIC HEPATOCYTE POPULATIONS AND TO LIVER CANCER INDUCED BY N-2-FLUORENYL-ACETAMIDE, ETHIONINE, OR OTHER HEPATOCARCINOGENS.

(Eng.) Okita, K.; Farber, E. (Fels Res. Inst., Temple Univ., Philadelphia, PA 19140). *Gann Monogr. Cancer Res.* 17:283-292; 1975.

Current knowledge of precursor populations for hepatocellular carcinoma is reviewed, and new data indicating the presence of a highly reproducible positive marker for preneoplastic liver cells are presented. In addition, new data concerning the basis for nodular proliferation and a possible role of arrested differentiation in this phase of carcinogenesis are reported. A new common antigen, preneoplastic (PN) antigen, has been found in rats in both early and late hyperplastic nodules induced by N-2-fluorenylacetamide (2-FAA) or ethionine and in primary hepatocellular carcinomas induced by 2-FAA, ethionine, 3'-methyl-4-dimethylaminoazobenzene, dimethylnitrosamine, or diethylnitrosamine. In the present study, experiments concerning the subcellular distribution of PN antigen in hyperplastic nodule tissue revealed that the antigen is probably microsomal. Antiserum to the crude antigenic preparations induced in rabbits was absorbed with a crude preparation from normal rat liver. The supernatants were tested after absorption for antibody against hyperplastic liver nodules. A highly reproducible antibody to one or more components in the hyperplastic nodule was found in all antisera prepared against nodule tissue. An apparently identical precipitation line was found when antigen preparations from hyperplastic nodules or from primary hepatomas were used. Thus, the presumed preneoplastic and the neoplastic cell populations contain some antigenic component(s) not present in normal liver. The antigen was not found in normal mature rat liver, fetal liver, amniotic fluid, adult normal serum, serum from rats with hyperplastic nodules or primary hepatomas, or in normal kidney, spleen, heart, lung, gastrointestinal tract, or brain. Immunofluorescent staining showed that it was present only in hepatocytes in hyperplastic nodules or in primary hepatomas. The PN antigen did not seem to be related to rat group-specific (gs) 1-antigen or gs 3-antigen. The PN antigen may be related to an interruption in differentiation or remodeling of liver parenchyma. The possible use of such an antigen in the study of human cirrhosis and cancer, and in carcinogenesis in other organs is discussed.

7885 EFFECTS OF α-AMANITINE ON CHROMATIN IN REGENERATING RAT HEPATOCYTES: A BIOCHEMICAL AND MORPHOLOGICAL STUDY.

(Eng.) Derenzini, M.; Marinozzi, V.; Novello, F. (Istituto de Patologia Generale dell'Universita di Bologna, Via S. Giacomo 14, 1-40126 Bologna, Italy). *Virchows Arch. [Zellpathol.]* 20(4):307-318; 1976.

In an attempt to correlate the morphologic pattern of chromatin with its activity in nucleic acid synthesis, the ultrastructure and the changes in RNA and DNA synthesis were studied in the regenerating hepatocytes of partially hepatectomized Wistar rats treated with α-amanitine. At 15 hr after hepatectomy, RNA synthesis increased above 75%; synthesis continued to be elevated at 24 hr, although the increase was reduced to 42%. Thirty minutes after the i.p. injection of α-amanitine (50 µg/100 g), a 52% inhibition of RNA synthesis occurred. A 10-fold increase in DNA synthesis occurred at 24 hr after hepatectomy. α-Amanitine had no effect on DNA synthesis until 4 hr after administration, when the rate of thymidine incorporation was reduced from a mean level of 32.49 disintegrations per min (dpm) per g DNA to 15.79 dpm/g DNA. Almost all the chromatin in the nuclei of regenerating hepatocytes appeared as decondensed chromatin 15 hr, and particularly 24 hr, after partial hepatectomy. α-Amanitine induced a clear condensation of chromatin as early as 30 min after administration. The degree of condensation increased progressively until 2 hr after administration, when almost all chromatin was condensed. Because DNA synthesis was unchanged during the first 2 hr after α-amanitine administration, it is concluded that chromatin condensation did not affect the DNA synthesis.

7886 THE DEVELOPMENT OF THE GUINEA PIG GALLBLADDER EPITHELIAL CELLS.

(Ger.) Schiebler, T. H.; Lang, K.; Wahlin, T. (Anatomisches Institut der Universitat Wurzburg, D-8700 Wurzburg, Koellikerstr. 6, W. Germany). *Histochemistry* 45(3):177-190; 1975.

The localization of mucosubstances in the developing guinea pig gallbladder epithelium was studied histochemically by light microscopy. The gallbladders of 106 guinea pigs were examined, including 60 embryos, 22 animals on postnatal days 1-31, and 24 adults. All of the developmental decisive steps in the gallbladder epithelium occur between embryonic day 30 and postnatal day 10. Prior to embryonic day 30, the gallbladder epithelium lacks any morphological or histochemical characteristics. The developmental midpoint is embryonic day 45-63; the gallbladder is essentially adult by postnatal day 10. Between embryonic day 30-44, the nuclei assume a deeper position and the pseudostratified columnar epithelium changes to simple columnar epithelium with numerous mitoses. Nuclear division takes place almost exclusively in the apical regions. Basal membranes are deficient, and cell migration on the superficial epithelium is visible. In this interval, there is invagination of the underlying mesenchyme. Gradually increasing levels of neutral and carboxylated mucoproteins in apical and subapical gallbladder epithelium are also demonstrable by embryonic day 30-44; they are PAS-positive and amylase resistant. During embryonic day 30-57, rich glycogen deposits develop; their onset is early, increasing especially between embryonic day 45 and 55, and then disappearing completely. Their location is mainly basal and subapical. On embryonic day 48, strongly acidic sulfated glycoproteins appear in the invaginations, increasing steadily to adult levels by embryonic day 63. The supranuclear cytoplasm appears to be decisive in the sulfation process. "Light cells" appear on embryonic day 58, are reduced in number postnatally, and remain deep in the smaller invaginations after postnatal day 6 and in the adult guinea pig. They form small clusters between the epithelial cells and certain carboxylated and neutral, but little-sulfated, mucosubstances. There are no goblet cells, but transient glandular cells are not uncommon. Only some prenatal epithelial cells are secretory, but this changes postnatally, as the increasing volume and pigmentation of the gallbladder contents indicates; the acid mucosubstances are evidently involved. The apical and subapical mucus of adult epithelium is heavily sulfated, resistant to neuraminidase, hyaluronidase, and amylase, and contains carboxyl groups. According to conventional classification, GC-mucin A and S-mucin A are involved.

7887 EXPERIMENTAL SURGERY IN PANCREAS AUTOTRANSPLANTATION.

(Ger.) Meyer, W.; Kivelitz, H.; Petersen H.; Steinmeyer, Ch. (Chirurgische Univ.-Klinik, D-4000 Dusseldorf, Moorenstr. 5, W. Germany). *Langenbecks Arch. Chir.* 340(2):107-115; 1975.

Pancreatic autotransplantation was performed in dogs to study exocrine and endocrine behavior after denervation and interruption of lymph drainage and to clarify the onset of fibrosis in cases of a nonligated pancreatic duct. Laparotomies and one-stage heterotopic pancreaticoduodenal autotransplantations, including cholecystojejunostomy, gastrojejunostomy, and duodenojejunal anastomosis, were performed in 10 dogs. Six animals died of technical error and two died of hemorrhagic pancreatitis. The remaining two survived 7 and 12 months. Initial weight loss and increased fecal fat was attributed to depressed exocrine function. Immediate postoperative values included a 66.7% hematocrit, 21,900 leukocytosis, serum amylase elevation (2,120 Somogyi units), and transient hyperglycemia (114 mg%). Several months postoperatively, the amylase and blood sugar were normalized. Tolbuamide assay on days 8-75 found an insulin surge, fter which the hypoglycemic interval was longer han that of control animals. Glucose tolerance on ostoperative days 59 and 132 showed a brief increase, hen a decrease and normalization within 2 hr. No iarrhea or steatorrhea occurred in the dogs, but low-grade increase in fecal fat continued. Macroscopic review of the transplant 4 months postoper- tively found no edema or anastomotic fistulas. istologically, normal acinar cells were present ithout fibrosis and the islets of Langerhans were nchanged. This experimenatal model is useful for he long-term evaluation of heterotopic transplanta- ion of the pancreas. Denervation and lymphatic in- erruption may cause a transient but not definitive nfluence on pancreatic endocrine and exocrine unction.

888 CORRELATION OF ^{85}Kr GASTRIC MUCOSAL FLOW DETERMINATIONS. (Eng.) Jochimsen, P. R.; osin, H. (Dept. Surgery, Univ. Iowa Hosp., Iowa ity, IA 52242). *J. Surg. Res.* 19(5):309-313; 1975.

he use of ^{85}Kr in the determination of mucosal flow s described, and the accuracy of this method was ompared with that of ^{86}Rb clearance. The two me- hods are based upon widely different assumptions: he ^{85}Kr method is based upon the monoexponential ecay of a flow-limited substance, and the ^{86}Rb ethod is based upon fractional clearance or uptake. aseous ^{85}Kr dissolved in saline, at a specific ac- ivity of 0.8 mCi/cm^3, was injected as a 0.1-cm^3 olus into the splenic arteries of 16 dogs. Three ^{5}Kr determinations were made, followed by an i.v. njection of ^{86}Rb. The mean of three mucosal blood low determinations by the ^{85}Kr method was compared ith a single determination by the ^{86}Rb method. The ean ratio of ^{86}Rb-determined flow to ^{85}Kr-deter- ined flow was 0.99 ± 0.12. A plot of the ^{86}Rb- etermined mucosal flow versus the ^{85}Kr-determined low revealed a correlation coefficient of +0.893, ndicating a close agreement between the two methods. he results suggest that both methods measure muco- al blood flow accurately.

7889 THE EFFECT OF NEUROLEPTICS ON THE DEVELOPMENT OF GASTRIC ULCERS IN RATS EXPOSED TO RESTRAINT-COLD STRESS. (Eng.) Hano, J.; Bugajski, J.; Danek, L.; Wantuch, C. (Inst. Phar- acology, Polish Acad. Sciences, 52, Ojcowska, 31-344 Krakow, Poland). *Pol. J. Pharmacol. Pharm.* 28(1):37-47; 1976.

xperiments were carried out in Wistar rats to de- ermine how and to what degree severe neurogenic tress induces the occurrence of biochemical and orphological changes in rats, to what degree neu- oleptics prevent changes provoked by the action of cute stress, and whether changes in the secretory unction of the gastric mucosa in stress conditions ight elucidate the development of hemorrhagic les- ons in the stomach. When rats were subjected to hilling and immobilization, the incidence of gas- ric lesions increased with time, reaching 85% at hr. The blood glucose concentration rose slight- y during the first hour of stress, after which it fell by 30-57% in the third and fourth hours. The serum free fatty acid level increased by 80% in the third hour of stress. Immobilization alone at 18 C caused a significant decrease, 27-42%, in the volume of gastric secretion. When the temperature was lowered to 6 C, the volume of the secretion decreased by as much as 61%. The i.p. administration of chlorpromazine, thioridazine, or spiroperidol (1, 5, or 10 mg/kg) 0.5 hr before stress produced hyperglycemia in rats not subjected to stress; within 3 hr after the injection of the higher doses, the rise in glucose concentration reached 28%. In stressed rats, chlorpromazine, thioridazine, and spiroperidol caused hyperglycemia, and the higher doses increased the glucose level by 49-104%, while fluphenazine (0.01 mg/kg) had no effect. All doses of chloropromazine attenuated the development of hemorrhagic lesions of the gastric mucosa; the two larger doses decreased the number of animals in which gastric ulcers developed during stress. The index of the preventive action after the highest dose of chloropromazine was 80%, and after the 1- and 5-mg/kg doses was 67% and 58%, resp. Thioridazine also diminished the incidence of ulceration in stressed animals by 41-77%. Stress ulceration was diminished by 77-90% in animals treated with spiroperidol. The administration of fluphenazine at 0.01 and 0.1 mg/kg reduced the number of hemorrhagic lesions and the ulcer index by 65%; 1-10 mg/kg of fluphenazine increased both the incidence and the ulcer index in stressed rats. Chlorpromazine and thioridazine decreased the serum K level by 6-26% in stressed rats. The prevention of gastric ulceration by neuroleptics might be the result of their antisecretory action and the inability to counteract the breakdown of sympathetic activity during severe stress.

7890 SEPARATION OF GASTRIC MUCOSAL CELLS OF RAT WITH PROTEOLYTIC ENZYMES, PRONASE AND TRYPSIN, WITH SPECIAL REFERENCE TO THE COLLECTION, MORPHOLOGY AND VIABILITY OF THE GENERATIVE CELLS. (Eng.) Kurokawa, Y.; Saito, S.; Kanamaru, R.; Sato, T; Sato, H. (Res. Inst. Tuberculosis, Leprosy, Cancer, Tohoku Univ., Sendai, Japan). *Tohoku J. Exp. Med.* 116(3):241-252; 1975.

Methods to obtain cell suspensions from the neck zone of the gastric mucosa of rats with high ratios of G cells are reported and evaluated. Better results were achieved with pronase (1.0%) than with trypsin (2.0%) in collecting single isolated cells, with higher cell yields and viability. The cells dissociated with trypsin retained glandular structures as *in situ*. The measurement of radioactivity revealed that the incorporation of ^{3}H-thymidine into generative cells was highest in the cell suspension collected by the second 15-min dissociation. It is concluded that the most effective method of obtaining dissociated cells from the generative zone of the mucosa is to collect the cells dissociated with 1.0% pronase continuously for a period from 15 to 45 min after the start of dissociation. On autoradiographic analysis with ^{3}H-thymidine, the ratio of generative cells was 10%, approximately 3 x 10^{6} cells, in the specimens.

7891 FUNCTIONAL CHARACTERISTICS OF PEYER'S PATCH CELLS. III. CARRIER PRIMING OF T CELLS BY ANTIGEN FEEDING. (Eng.) Kagnoff, M. F. (Dept. Medicine, Univ. California, San Diego, La Jolla, CA 92037). *J. Exp. Med.* 142(6):1425-1435; 1975.

The possibility that the p.o. administration of antigen (chicken or sheep RBC) leads to a priming of thymus-derived (T) cells in Peyer's patches was studied in BDF_1 mice. Carrier priming was assessed by measuring the ability of irradiated Peyer's patch cells from sheep RBC-fed mice to enhance the anti-trinitrophenyl (TNP) response of Peyer's patch cultures stimulated with TNP-sheep RBC. The addition of irradiated Peyer's patch cells from sheep RBC-fed mice to normal Peyer's patch cultures consistently enhanced the specific anti-TNP and anti-sheep RBC response of normal Peyer's patch culture four- to fivefold. Priming of T helper cells occurred when the RBC were administered p.o., but not when they were injected i.v. or i.p. When the experiment carried out in control mice or mice fed chicken RBC, the anti-TNP response was not enhanced. Antigen feeding did not result in significant induction of Peyer's patch B cells to humoral antibody synthesis *in vivo*. Since Peyer's patch T cells can be carrier-antigen primed for helper function in the absence of B-cell induction to humoral antibody synthesis, these studies may indicate that T-cell priming is less dependent than B-cell induction on cooperating accessory adherent cells.

7892 CELLULAR IMMUNE RESPONSE IN RATS FOLLOWING ORAL IMMUNIZATION [Abstract]. (Eng.) Andre, C.; Druguet, M. (Hopital Edouard-Herriot, Pavillon H, F-69374 Lyon Cedex 2, France). *Digestion* 13 (3):162; 1975.

7893 THE EFFECT OF CIMETIDINE ON GASTRIC POTENTIAL DIFFERENCE IN MAN [Abstract]. (Eng.) Ivey, K. J.; Baskin, W. N.; Jeffrey, G. E. (Veterans Hosp., Univ. Missouri, Columbia, MO). *Clin. Res.* 23 (4):481A; 1975.

7894 HUMAN EXPERIMENTATION IN DIGESTIVE DISEASE RESEARCH. (Eng.) Anonymous. (Work Group XII, Natl. Inst. Arthritis, Metabolism, and Digestive Diseases, Bethesda, MD). *Gastroenterology* 69(5): 1165-1182; 1975.

7895 CELLULAR LOCALIZATION OF KALLIKREINS IN RAT SUBMANDIBULAR AND SUBLINGUAL SALIVARY GLANDS. IMMUNOFLUORESCENCE TRACING RELATED TO HISTOLOGICAL CHARACTERISTICS. (Eng.) Orstavik, T. B.; Brandtzaeg, P.; Nustad, K.; Halvorsen, K. M. (Dept. - Microbiology, Dental Faculty, Univ. Oslo, Blindern, Oslo, Norway). *Acta Histochem.* 54(2):183-192; 1975. (2):183-192; 1975.

7896 COMPENSATORY ADAPTIVE PROCESSES IN THE NERVOUS ELEMENTS OF THE INTRAMURAL PLEXUS OF THE SMALL INTESTINE FOLLOWING RESECTION OF HALF OF IT. (Rus.) Malatsidze, V. Sh. (A. N. Natashvili Inst. Experimental Morphology, Georgian SSR Acad. Sciences, Tbilisi, USSR). *Biull. Eksp. Biol. Med.* 80(11):116-119; 1975.

7897 HISTOCHEMICAL FACTORS INFLUENCING SULFATION OF THE MUCOSUBSTANCES OF BRUNNER'S GLANDS IN THE HUMAN DUODENUM. (Fre.) Pizzolato, P.; Berger, C. (Veterans Admin. Hosp., Louisiana State Univ., Medical Center, New Orleans, LA 70112). *Acta Histochem.* 54(2):247-256; 1975.

7898 ANTITROPHIC ACTION OF SECRETIN ON THE INTESTINAL CELL RENEWAL IN RATS [Abstract]. (Eng.) Berard, A.; Pansu, D.; Dechelette, A. M.; Lambert, R. (INSERM-45, F-69374 Lyon Cedex 2, France). *Digestion* 13(3):164; 1975.

7899 A NEW NON-SURGICAL METHOD TO DETERMINE THE RATIO OF THE HEPATIC ARTERIAL BLOOD FLOW TO THE TOTAL HEPATIC BLOOD FLOW IN THE DOG [Abstract]. (Eng.) Diaz, A.; Duval, M.; Peignoux, M.; Lebrec, D.; Benhamou, J. P. (INSERM U-24, Hopital Beaujon, Clichy, France). *Digestion* 13(3):167; 1975.

7900 ROLE OF STEM CELL MIGRATION IN INITIATION OF MOUSE FOETAL LIVER HAEMOPOIESIS. (Eng.) Johnson, G. R.; Moore, M. A. S. (Dept. Zoology, Univ. Melbourne, Parkville, Victoria 3052, Australia). *Nature* 258(5537):726-728; 1975.

7901 EXPERIMENTAL LIVER DISEASES. (Eng.) Cornelius, C. E.; Himes, J. A.; Gronwall, R. R. (Coll. Veterinary Medicine, Univ. Florida, Gainesville, FL 32610). *Methods Achiev. Exp. Pathol.* 7: 22-55; 1975.

7902 EXPERIMENTAL OBSTRUCTIVE JAUNDICE AND CHANGE OF GASTRODUODENAL SEROTONIN CONTENT IN THE RAT. (Eng.) Kato, Y.; Kodama, M.; Nomura, Y.; Segawa, T. (Hiroshima Univ. Hosp., Hiroshima, Japan). *Hiroshima J. Med. Sci.* 24(4):205-211; 1975.

7903 INTERACTION OF A CARCINOGEN: METHYL-7-BENZO(a)ANTHRACENE, WITH DNA IN THE PRESENCE OF HAMSTER LIVER MICROSOMAL EXTRACTS. (Fre.) Kawamura, H. (Section de Physique et Chimie de la Fondation Curie, Institut du Radium, 11, rue Pierre-et-Marie-Curie, 75231 Paris Cedex 05, France). *Chem. Pharm. Bull. (Tokyo)* 24(2):186-192; 1976.

7904 INTRODUCTION. (Eng.) Butler, W. H.; Newberne, P. M. *In: Mouse Hepatic Neoplasia. Proceedings of a Workshop held at the H.T.S. Management Center, Lane End, High Wycombe, Great Britain, 12-17 May 1974.* (New York: Elsevier Scientific Publishing Company): pp. 1-5; 1975.

7905 RPHOLOGY OF SPONTANEOUS AND INDUCED NEO- ASIA. (Eng.) Jones, G.; Butler, W. H. *In: Mo lepatic Neoplasia. Proceedings of a Workshop he t the H.T.S. Management Center, Lane End, High Wy e, Great Britain, 12-17 May 1974.* (New York: Elsevier Scientific Publishing Company): pp. 21-59; 1975.

7906 CARCINOGENESIS AND CELL PROLIFERATION IN MOUSE LIVER WITH DIMETHYLNITROSAMINE. (Eng.) Takayama, S. *In: Mouse Hepatic Neoplasia. Proceedings of a Workshop held at the H.T.S. Management Center, Lane End, High Wycombe, Great Britain, 12-17 May 1974.* (New York: Elsevier Scientific Publishing Company): pp. 61-75; 1975.

7907 THE NATURAL HISTORY OF HEPATIC PARENCHYMAL NODULE FORMATION IN A COLONY OF C57BL MICE WITH REFERENCE TO THE EFFECT OF DIET. (Eng.) Gellatly, J. B. *In: Mouse Hepatic Neoplasia. Proceedings of a Workshop held at the H.T.S. Management Center, Lane End, High Wycombe, Great Britain, 12-17 May 1974.* (New York: Elsevier Scientific Publishing Company): pp. 77-109; 1975.

7908 STRAIN DIFFERENCE IN NATURAL INCIDENCE AND RESPONSE TO CARCINOGENS. (Eng.) Grasso, P.; Hardy, J. *In: Mouse Hepatic Neoplasia. Proceedings of a Workshop held at the H.T.S. Management Center, Lane End, High Wycombe, Great Britain, 12-17 May 1974.* (New York: Elsevier Scientific Publishing Company): pp. 111-132; 1975.

7909 NEONATAL INDUCTION OF HEPATIC AND OTHER TUMOURS. (Eng.) Roe, F. J. *In: Mouse Hepatic Neoplasia. Proceedings of a Workshop held at the H.T.S. Management Center, High Wycombe, Great Britain, 12-17 May 1974.* (New York: Elsevier Scientific Publishing Company): pp. 133-142; 1975.

7910 TRANSPLANTATION STUDIES. (Eng.) Reuber, M. D.; Gellatly, J. B. *In: Mouse Hepatic Neoplasia. Proceedings of a Workshop held at the H.T.S. Management Center, Lane End, High Wycombe, Great Britain, 12-17 May 1974.* (New York: Elsevier Scientific Publishing Company): pp. 143-153; 1975.

7911 COMPARISON OF NEUTRAL RED AND OTHER MARKERS USED FOR THE ESTIMATION OF GASTRIC MUCOSAL BLOOD FLOW [Abstract]. (Eng.) Chahal, P.; Holton, P.; King, J. A. (St. Mary's Hosp. Medical Sch., Paddington, London, W2 1PG, England). *J. Physiol.* 256 (1):29p; 1976.

7912 CHROMATOGRAPHIC, CHEMICAL AND IMMUNOLOGICAL DIFFERENCES IN COMPOSITION OF GASTRIC JUICE GLYCOPROTEINS IN MAN AND THEIR CELLULAR ORIGIN [Abstract]. (Eng.) Glass, G. B. J.; Badurski, J. E.; Ito, H.; Patkowska, M. (Gastroenterology Res. Lab., Medical Coll., New York, NY). *Digestion* 13(3):170-171; 1975.

7913 CELL PROLIFERATION IN CANINE EXPERIMENTAL ATROPHIC GASTRITIS [Abstract]. (Eng.) Casteleyn, P. P.; Willems, G. (Lab. Experimental Surgery, Brussels Free Univ., [VUB], Brussels, Belgium). *Digestion* 13(3):165; 1975.

7914 SELECTIVE INHIBITION OF BICARBONATE SECRETION BY THE PERFUSED RAT COLON DURING HEMORRHAGIC SHOCK [Abstract]. Noel, D.; Sicotte, C.; Devroede, C. (Dept. de Chirurgie, CHU, Sherbrooke, Quebec, Canada). *Clin. Res.* 23(5):622A; 1975.

7915 STUDIES ON PEPTIDES. LV. TOTAL SYNTHESIS OF PORCINE MOTILIN, A GASTRIC MOTOR ACTIVITY STIMULATING POLYPEPTIDE. (Eng.) Kai, Y.; Kawatani, H.; Yalima, H.; Itoh, Z. (Faculty Pharmaceutical Sciences, Kyoto Univ., Kyoto, Japan). *Chem. Pharm. Bull.* 23(10):2346-2352; 1975.

See also, 7688, 7705, 7706, 7868, 7930, 7999.

DIAGNOSTIC PROCEDURES

7916 IMMUNOELECTROPHORESIS TEST IN AMOEBIASIS. (Eng.) Vinayak, V. K.; Tandon, B. N.; Talwar, G. P.; Mohapatra, L. N.; Prakash, O. (Postgraduate Inst. Medical Education Res., Chandigarh, 160011, India). *Indian J. Med. Res.* 64(5):661-667; 1976.

The value of the immunoelectrophoresis (IEP) test in the diagnosis of amebiasis was compared with that of the agar gel diffusion (GEL) and the indirect hemagglutination (IHA) tests, using a common amebic antigen. Amebiasis was detected by the IEP test in 41 of the 45 patients (91.1%) with invasive amebiasis. Gel detected 38 cases (84.4%), and the IHA test detected 42 cases (93.3%). No false-positive reactions were obtained with the IEP and GEL tests, whereas the IHA test gave positive reactions in 14.2% of 35 patients with nonamebic intestinal and hepatic disorders and in 10.0% of 30 healthy subjects. Several bands were obtained in immunoelectrophoretic slides, but one prominent band located near the well was considered to be characteristic for amebiasis. A comparison of the three tests revealed that, although the IHA test is slightly more sensitive, the IEP test is more discriminatory and coincided better with clinical investigations.

7917 RADIOLOGICAL CHANGES IN AMOEBIC LIVER ABSCESS. (Eng.) Naik, G. A.; Kamat, G. R.; Vibhute, J. V. (Jaslok Hosp. Res. Center, Bombay 40016, India). *Indian J. Radiol.* 29(2):89-95; 1975.

The radiologic changes seen in 73 patients with amebic liver abscesses are presented. A significant elevation of the right dome of the diaphragm was seen in 62% of the cases when the conventional posteroanterior view was used; this was increased to 73% when a right lateral view was used. A localized bulge in the diaphragm was seen in 53% of cases, and flattening occurred in 23%. The two most common pleuropulmonary abnormalities were occlusion of the right costophrenic angle (40%) and right oblique fissure thickening (58%). Obscuring of the hepatic angle, downward enlargement of the liver, and downward displacement of the hepatic flexure occurred in 15%, 67%, and 68% of the cases, resp. The right kidney was displaced downward in 12%. If the conventional posteroanterior radiographic view of the chest does not reveal any abnormalities in a patient with suspected amebic liver abscess, it is essential to also use a right lateral view and to perform a plain abdominal radiograph.

7918 PROBLEMS IN DISTINGUISHING TUBERCULOSIS OF BOWEL FROM CROHN'S DISEASE IN ASIANS. (Eng.) Burke, G. J.; Zafar, S. A. (Bulawayo Group Hosps., Bulawayo, Rhodesia). *Br. Med. J.* 4(5993): 395-397; 1975.

The cases of five Asian patients with intestinal tuberculosis who were initially thought to have Crohn's disease are presented. The first patient, a 23-yr-old Pakastani man, was hospitalized four times before the correct diagnosis was made. His symptoms included abdominal pain, vomiting, diarrhea, constipation, and weight loss. Two initial diagnoses were perforated duodenal ulceration and diverticulitis. At the third admission, a barium enema examination revealed three internal fistulae arising from the rectum, rectosigmoid, and distal sigmoid colon, and the terminal ileum was seen to have a narrowed lumen with proximal stasis and dilatation. Crohn's disease was diagnosed, but a subsequent chest x-ray disclosed a left apical focus, and cultures of feces, urine, and sputum grew *Mycobacterium tuberculosis*. The patient responded to chemotherapy. The second patient, a 10-yr-old Indian boy, had intermittent right-sided pain following an ileotransverse colostomy for a large cecal mass. A chest x-ray revealed a primary, calcified complex. *M. tuberculosis* was cultured from an abscess that discharged spontaneously on the anterior abdominal wall. The third patient, a 54-yr-old Pakastani woman, presented with acute intestinal obstruction. Laparotomy revealed ileocecal obstruction secondary to a mass in this region, with an ulcer crater and a few tubercle-like lesions of the serosal surface of the ileum. The chest x-ray was initially normal. A side-to-side ileotransverse anastomosis and right hemicolectomy were performed. A subsequent chest x-ray revealed active tuberculosis. At the site of the anastomosis, the segment was narrowed, the mucosa was destroyed, and deep "rose thorn" ulcers were present. Barium enema in the fourth patient, a 31-yr-old Pakastani man, revealed a narrowing of part of the transverse colon, with a cobblestone appearance and irregular contours. The ascending colon was narrowed, with a loss of haustration and "collar-button" ulcers. There was a fistula between the ileum and ascending colon. The fifth patient, a 35-yr-old Indian woman, had a palpable mass in the right iliac fossa, and a barium meal disclosed dilated loops in the terminal ileum. At surgery, granulomatous giant cell inflammation was seen in the muscularis mucosa. Tuberculous bowel disease should be considered in immigrant patients presenting with abdominal symptoms and a mass.

7919 THE ROLE OF COLOSCOPY IN THE DIFFERENTIAL DIAGNOSIS BETWEEN IDIOPATHIC ULCERATIVE COLITIS AND CROHN'S DISEASE OF THE COLON. (Eng.) Banche, M.; Rossini, F. P.; Ferrari, A.; Roatta, L.; Gilli, E.; Cirillo, R. (Facolta di Medicina e Chirurgia dell'Universita di Torino, Torino, Italy). *Am. J. Gastroenterol.* 65(6):539-545; 1976.

Experience with coloscopy in the diagnosis of Crohn's disease and idiopathic ulcerative colitis (IUC) is presented. Between 1971 and 1974, 2,478 coloscopies were carried out; 182 cases of IUC and 104 cases of Crohn's disease were diagnosed. The annual incidence of IUC was about the same over the 4-yr period, whereas that of Crohn's disease increased. The percentage of patients with Crohn's disease increased from 0% in 1971 to 45.38% in 1974. Endoscopic features of IUC include: diffuse edema and shiny mucosa, bleeding on contact, widespread ulcerations, oozing hemorrhages, friable inflammatory polyps, granularity of mucosal surface, noninfiltrated walls and absence of haustra, little or no motility, and abundant secretion. Endoscopic features of Crohn's disease include: well-de-

ned areas of hyperemia, no bleeding on contact,
hta-like ulcerations, normal mucosa surrounding
sions, flat lengthwise ulcers with red edges, no
zing hemorrhage, hard papular formations, cobble-
one mucosa, wall rigidity, little or no secretion,
stula orifices, and stenosis. Coloscopy was useful
distinguishing different stages of both IUC and
ohn's disease, and may be regarded a useful proce-
re in diagnosing nonspecific inflammatory diseases of
e colon.

20 FOCAL AND GENERALIZED HEPATIC LESIONS: A COMPARISON OF LIVER SCANS WITH ANATOMIC
D HISTOLOGIC FINDINGS.

(Eng.) Ferlin, G. (Osped-
e Generale Provinciale, Castelfranco Veneto, Italy).
Nucl. Biol. Med. 19(3):135-144; 1975.

28 normal patients and 150 patients with liver
seases, the results of scintiphotography were
mpared with histologic and anatomic findings
tained with biopsy (111 cases), percutaneous
edle biopsy (15 cases), and surgery or autopsy
2 cases). Liver images were obtained using
^{m}Tc-sulfur colloid and scanner or Anger camera.
o groups of images, one characterized by cold
eas only (51 cases), and the other by generalized
normalities and variable degrees of spleen and
ne marrow uptake (74 cases), agreed with anatomic
d histologic findings in 45 (90%) and 71 (96%)
ses, resp. Twenty-two liver studies, showing
neralized abnormalities with intense extrahepatic
ticuloendothelial system uptake and focal lesions
re included in a third group: in nine of these
ses (46%), there was cirrhosis and cancer. In
patients, the images were normal; 21 had no
ver disease (67%), 3 had metastatic lesions, and
had fatty liver. Scintiphotography was abnormal
93% of liver diseases (140 cases). In 146 cases
2%), there was complete agreement with anatomical
d histological findings.

21 ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY.

(Ger.) Soehendra, N.; Rehner, M.; Zimmer,
; Wehling, H. (Chirurgische Universitatsklinik, 2
mburg 20, Martinistrasse 52, W. Germany). *Med.
in.* 70(21):935-940; 1975.

e role of endoscopic retrograde cholangiography (ERC)
biliary disease is detailed. The study comprised
1 ERC procedures, representing a success rate of
% from an initial 134 probes. Target or selective
le duct presentation was achieved in 83 of 100
ials. The range of ERC findings included 16 cases
th no pathology, 12 with cholecystolithiasis, 10
th choledocholithiasis with or without papillary
enosis, 6 with intrahepatic cholestasis, 9 with
stcholecystectomy papillary stenosis, 5 with
olecystolithiasis and choledocholithiasis, 5 with
olecystolithiasis and papillary stenosis, 5 with
choledochoduodenostomy, 3 with cystic stump
ndromes, 3 with carcinoma of the common duct, 3
th carcinoma of the head of the pancreas, and
her disorders including 1 case each of gall-
adder carcinoma, liver metastases, and 1 papil-
ry adenoma. Among these were 26 cholecystectomies,
5 choledoduodenostomies, 2 Billroth I operations, 2 Billroth II operations, and 1 partial duodenopancreatectomy. Acute pancreatitis is the most frequent severe side-effect (2% of the cases); acute cholecystitis has also occurred; both side-effects arise from filling defects. To avoid air-pocket simulation of stones, the cannula must be carefully filled with contrast medium. False images of ductal occlusion can result from incomplete filling, which is tractable by proper pressure control. Contraindications include acute pancreatitis or pancreatic cysts, severe decompensated corpulmonale, and aortic aneurysm. Special indications include suspected cholestases, unclear persistent or recurring complaints after biliary surgery, and liver tumors.

7922 ANTEGRADE VISUALIZATION OF BILE DUCTS BY PERCUTANEOUS TRANSJUGULAR CHOLANGIOGRAPHY.

(Ger.) Huchzermeyer, H.; Luska, G.; Freyschmidt, J. (Abteilung Gastroenterologie, Dept. Innere Medizin, Medizinische Hochschule Hannover, Hannover, W. Germany). *Leber Magen Darm* 6(1):8-14; 1976.

Experiences with antegrade presentation of the bile ducts in 22 patients are reported and compared with other cholangiographic methods. The accuracy of percutaneous transjugular cholangiography (PTC) is 88-93%, which is higher than that for transhepatic cholangiography. The PTC was unsuccessful in three patients who showed only a slight elevation in cholestasis enzymes and a bilirubin level below 2 mg%. Higher bilirubin levels are usually associated with more effective visualization; in one case of choledocholithiasis with incomplete occlusion, the ductal system was dilated despite low bilirubin. No complications with PTC were found, not even biliovenous fistula. Based on literature data, acute purulent cholangitis is the only contraindication. PTC is the method of choice in diagnosing bile duct diseases. It has been used successfully in patients with obstructive syndrome when clinical, paraclinical, and endoscopic methods were unable to differentiate intra- and extrahepatic cholestasis. For icteric patients with acute pancreatitis and complete stenosis of the hepatocholedochus, PTC is especially useful. Moreover, simultaneous liver biopsy is possible. Further diagnostic modalities include ductal pressure measurements, bacteriological and cytological examination of liver bile, hepatovenography and hepatic vein or caval angiography, and blood sampling from the hepatic vein for metabolic studies. The technical versatility of this procedure permits its use in combination with other methods.

7923 GRAY SCALE ULTRASOUND IMAGING. THE ANATOMY AND PATHOLOGY OF THE LIVER.

(Eng.) Taylor, K. J. W.; Carpenter, D. A.; Hill, C. R.; McCready, V. R. (Yale-New Haven Hosp., 789 Howard Ave., New Haven, CT 06504). *Radiology* 119(2):415-423; 1976.

A machine for gray-scale ultrasound imaging was developed and used to investigate hepatobiliary disease, especially in relation to malignancy. The machine employs a frequency of 3 MHz and a focused transducer that produces a lateral resolution of 2-3 mm over much of the beam length. In usage, the patient is supine, mineral oil is spread over the upper abdomen, and the transducer is angled under the costal margin, pointing toward the head. A simple parasagittal sector scan covers the entire right lobe of the liver, so that tumors and abscesses under the diaphragm are well-visualized. Serial sections are taken from the left of the midline to the farthest possible right of the midline. Holding the breath is advised, as it brings the liver edge below the costal margin and deflects the air-containing colon downward. In a follow-up of patients coming to laparotomy or postmortem within 3 weeks of a scan, the technique was diagnostic in 82% and contributory in an additional 10%. Unlike radionuclide scanning, few equivocal results are obtained. A major feature is the enhanced signal-to-noise ratio, so that low-level echoes are displayed. The data obtained are similar to those obtained by taking multiple cuts through the liver substance. Both diffuse and discrete pathologies are apparent. Tumor histology, which will still be required, can be obtained by liver biopsy under ultrasonic visualization.

7924 PROCTOSIGMOIDOSCOPY. AGE CRITERIA FOR EXAMINATION IN THE ASYMPTOMATIC PATIENT.

(Eng.) Corman, M. L.; Coller, J. A.; Veidenheimer, M. C. (Lahey Clinic Foundation, Boston, MA). *S. Afr. Cancer Bull.* 19(4):167-172; 1975.

A prospective study was carried out in 2,500 patients to assess the value of proctosigmoidoscopy in screening for colorectal cancer in asymptomatic patients. The patients underwent the procedure as part of a general examination, and the proctoscope was inserted to a mean length of 20 cm. Of the 2,500 patients, 1,834 were men (mean age, 51 yr) and 666 were women (mean age, 55 yr). A total of 432 lesions was found in 228 patients. Most were small and treated by fulguration without biopsy. The mean age of patients with benign polypoid lesions was 56 yr. Eight patients had adenocarcinomas; in two of these patients, carcinoma developed in a polypoid adenoma. All carcinomas occurred in patients over 50 yr of age. The authors propose the following program for the early detection of colorectal cancer: annual guaiac or orthotoluidine testing of the patient until the age of 50 yr; proctosigmoidoscopy and gastrointestinal investigations when the test is positive; stool testing for occult blood, supplemented by proctosigmoidoscopy after the age of 50 yr; proctoscopy every 2 yr thereafter; and proctoscopy annually for any patient with a history of rectal polyps or carcinoma.

7925 RELATIVE LIVER VOLUME IN STAGE I FATTY LIVER.

(Ger.) Sensing, H.; Mohr, B.; Scholtze, P. (Medizinische Poliklinik, Medizinische Akademie, Erfurt, E. Germany). *Dtsch. Gesundheitsw.* 31(18):822-825; 1976.

Correlations between radiological determination of relative liver volume and histologically confirmed degree of fatty liver (FL) are reported. The clinical sample of 127 FL patients was divided into three groups: 6 women and 19 men, average age 40 yr, with slight to moderate FL in less than 25% of the hepatocytes (group A); 11 women and 22 men, average age 40.6 yr, with moderate FL in 25%-50% of the hepatocytes (group B); and 15 women and 24 men, average age 44 yr, with massive FL in more than 50% of the hepatocytes (group C). A relative liver volume of 929.8 ml/m^2 was found in a control group of 8 women and 22 men, average age 41.3 yr. The relative liver volume in ml/m^2 for group A was 1,015.7, for group B, 1,070.1, and for group C, 1,185.3. The difference between the control value and groups B and C, and between the control value and the average of the three groups (1,102.4 ml/m^2) are significant. The difference between groups A and C is also significant There is a positive correlation between the relative liver volume and estimation of hepatomegaly by palpation. There is no correlation between relative liver volume and dye loading liver function tests. Relative liver volume is an effective measure of disease development in uncomplicated FL.

7926 A NEW DIAGNOSTIC TEST FOR PANCREATIC DISORDERS BY EXAMINATION OF PAROTID SALIVA.

(Eng.) Kakizaki, G.; Saito, T.; Soeno, T.; Sasahara, M.; Fujiwara, Y. (Akita Univ. Sch. Medicine, Akita, Japan). *Am. J. Gastroenterol.* 65(5):437-445; 1976.

The effectiveness of the parotid saliva test in the diagnosis of pancreatic diseases was studied by comparing its results with those of the pancreozymin-secretin test in 48 patients with pancreatic disorders, 82 patients with nonpancreatic diseases, and 16 healthy subjects. The patients with pancreatic disorders had a lower mean salivary output (0.274 ml/kg) and a lower mean maximum bicarbonate concentration (22.1 mEq/l) than the normal subjects and patients with nonpancreatic disorders (0.408 ml/kg and 34.4 mEq/l, resp.). An abnormal saliva test was found in 83.3% of the patients with the pancreatic disorders. Among 22 patients with pancreatic disorders and 22 patients with nonpancreatic disorders, an abnormal parotid saliva test was 88.6% accurate in diagnosing pancreatic disorders, whereas a positive pancreozymin-secretin test was only 65.9% accurate. It is concluded that the simple and rapid parotid test is sufficiently reliable to merit extensive clinical trials.

7927 THE DOUBLE-CONTRAST ENEMA: MYTHS AND MISCONCEPTIONS.

(Eng.) Laufer, I. (McMaster Univ. Medical Center, 1200 Main St., West, Hamilton, Ontario, Canada, L8S 4J9). *Gastrointest. Radiol.* 1(1):19-31; 1976.

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ALTERATIONS. (Eng.) Meyers, M. A. (Cornell Univ. Medical Coll., 525 East 68th St., New York, NY 10021). *Gastrointest. Radiol.* 1(1):49-58; 1976.

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7966 COMPARISON OF ENDOSCOPIC PANCREATOGRAPHY AND EXOCRINE FUNCTION IN PANCREATITIS [Abstract]. (Eng.) Salmon, P. R.; Baddeley, H.;

Machado, G.; Trapnell, J. (Dept. Medicine and Radiodiagnosis, Univ. Bristol., Bournemouth, England). *Ann. R. Coll. Surg. Engl.* 58(4):325; 1976.

7967 PANCREATOGRAPHY IN THE DIAGNOSIS OF CARCINOMA OF THE PANCREAS. (Eng.) Garabedian, M.; Shamszad, M. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *Med. Clin. North Am.* 59(2):239-246; 1975.

See also, 7735, 7774, 7968, 7969, 8020, 8040, 8055, 8056, 8074, 8079, 8087, 8104, 8110, 8129, 8131, 8147, 8160, 8164, 8176, 8179, 8180, 8181, 8182, 8183, 8206, 8216, 8218, 8227, 8235, 8237, 8241, 8293, 8316, 8329, 8331, 8334, 8335, 8336, 8337, 8355, 8400, 8402, 8403, 8414, 8422.

GASTROINTESTINAL DISEASES

ESOPHAGUS

7968 THE DEMONSTRATION OF HETEROTOPIC GASTRIC MUCOSA IN THE ESOPHAGUS WITH ^{99m}Tc PERTECHNETATE.

(Ger.) Marowski, B.; Ambrosius, G. (II. Innere Abteilung, Stadtisches Krankenhaus Am Urban, Berlin, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 125(1):44-47; 1976.

Scintigraphic studies of the Barrett esophagus are described, and three case histories are reported. Fasting patients received 3-5 mCi ^{99m}Tc-pertechnetate i.v., and the scintigram was prepared with 400,000 impulses 20-60 min postinjection. Scintigraphy found a continuous activity concentration cranially in the distal third of the esophagus, as far as a 5-cm-long stenosis, in a 65-yr-old man with deglutition problems. Endoscopy also found a hemorrhagic, polypoid mucosa and histologically, a columnar epithelium with littoral cells. A second patient, a 65-yr-old woman, with a stenosis also in the distal third of the esophagus, but no activity concentration above the gastroesophageal transition, was found to have an adenocarcinoma. A 74-yr-old man with a 20-yr history of episodic substernal pain on eating was found to have irregular constrictions in the distal esophagus directly above the cardia and motor incoordination (repetitive, nonperistaltic contractions). The presence of heterotopic gastric mucosa in the esophagus should be suspected in cases with pertechnetate activity concentrations between the esophageal stenosis and the cardia.

7969 ENDOSCOPIC DIAGNOSIS OF BARRETT'S ESOPHAGUS.

(Eng.) Desbaillets, L. G.; Mangla, J. C. (Monroe Community Hosp., 435 East Henrietta Road, Rochester, NY 14603). *Endoscopy* 8(2):65-70; 1976.

Four cases of Barrett's esophagus in which the diagnosis was confirmed by multiple serial biopsies are presented. A 53-yr-old man presented with a history of epigastric pain, heartburn, dysphagia, and hematemesis. Barium studies revealed an ulcer with a stricture at the junction of the upper and middle thirds of the esophagus. During esophagogastroscopy, serial biopsies of the esophagus demonstrated gastric mucosa up to the level of the stricture. The patient underwent a Nissen's fundoplication; 2 weeks later, his symptoms disappeared. Two years later, biopsies revealed the persistence of the same columnar epithelium originally seen. A 51-yr-old man gave a history of frequent hematemesis and high epigastric pain. A gastrointestinal series revealed an ulcer 5 cm above the lower end of the esophagus, and multiple biopsies during endoscopy confirmed the diagnosis of Barrett's esophagus. A 75-yr-old man had had several episodes of upper gastrointestinal bleeding of unknown etiology. Esophagogastroscopy revealed marked esophagitis, along with an edematous hyperemic and friable mucosa beginning at the junction of the upper and middle thirds of the esophagus. The mucosa was similar to that seen in pseudomembranous ulcerative colitis. Barrett's esophagus was diagnosed histologically. A 63-yr-old woman presented with increasing dysphagia after a 20-yr history of intermittent dysphagia and heartburn. Barium swallow revealed a hig esophageal stricture, and esophagoscopy with multipl biopsies confirmed the diagnosis of Barrett's esophagus. She was asymptomatic 6 months after a Nissen's fundoplication. In cases of Barett's esophagus, the epithelium becomes red, congested, velvety, and friable, and there may be many linear ulcerations, whic bleed easily on contact. In all cases, the mucosa is covered with a patchy, necrotic pseudomembrane. In Barett's esophagus, the mucosal appearance may be similar to that of the colon in ulcerative colitis, pseudomembranous colitis, or *Candida albicans* esophagitis.

7970 ON INTRAMURAL ESOPHAGEAL DIVERTICULOSIS.

(Ger.) Redlich, F. H. (II. Rontgeninstitut, Radiologisches Zentrum des Stadtischen Klinikums Berlin-Buch, DDR-1115 Berlin-Buch, E. Germany). *Radiol. Diagn. (Berl.)* 17(2):217-224; 1976.

Two additional case reports of esophageal diverticulosis are added to the 10 already in the literature. An 11-yr-old girl had presented neonatally with tran scient hiatal hernia and ulcerative reflux esophagit Several years later, a paraesophageal contrast medium depot was visible at the level of the middle to lower third of the esophagus, which suggested gastric ulcer. Transthoracic hiatal repair and fixatio of the esophagus above the cardia brought some clinical amelioration. Subsequent radiology found additional depots; esophagoscopy found no ulcer or stenosis, only residual inflammation compatible with reflux. Reflux was controlled by subsequent esophagofundopexy and gastropexy. A widening of the entir suprastenotic esophagus, with peristaltic failure and persistent depot signs, was found 2 yr later. An 8.5-yr-old girl presented with dilation of the upper third of the esophagus and with paraluminal contrast media depots at stenosis level, following a useless pylorotomy. There was no sign of ulceration and *N*-butylscopolammonium bromide management was ineffective. In hospital, the child was not anorectic, and her general condition improved; at home, the child was anorectic, and the vomiting resumed. Both cases represent the effects of isolated intramural diverticula, with persistent stenosis, dyskinetic peristalsis, and transient intraesophageal pressure elevation in the lower esophagus, which persisted unchanged for years. In addition to the typical round mucosal hernias, prickle-shaped diverticula were present, which suggested some involvement of traction mechanics. The etiology in each case was clearly psychogenic.

7971 A NEW ENDOSCOPIC CLASSIFICATION OF CHRONIC ESOPHAGITIS.

(Eng.) Rasmussen, C. W. (Endoscopic Clinic, 106 S. El Molino Ave., Pasadena, CA 91101). *Am. J. Gastroenterol.* 65(5):409-415; 1976.

Five macroscopically identifiable types of esophagitis encountered in a series of 97 cases studied endoscopically are described. Forty-three were classified as erosive-ulcerative, in which histological examination revealed an infiltration of the tunica propria with epithelial damage. In 15 cases, a healing stage of the first type was seen, characterized by white nodular scars. The Barrett type of esophagitis was seen in only two cases. The fourth type was typified by shallow and mainly irregular ulcerations at the esophagogastric border or within several areas of heterotopic gastric mucosa near the junction. Symptomatically, this type is identical to the first type, and differentiation can be made only by endoscopy. A stenosing type of esophagitis was seen in 11 cases. This represents the natural outcome of several prior attacks of esophagitis. Two special types of esophagitis were not included in the above classification: that seen after ingestion of strong acid or alkali and the ulcerative esophagitis in cases with Crohn's disease.

7972 THE MALLORY-WEISS-SYNDROME: A CLINICAL STUDY OF 20 CASES. (Eng.) Knoblauch, M.; Stevka, E.; Lammli, J.; Schauwecker, H.; Deyhle, P.; Frey, P.; Sauberli, H. (Univ. Hosp., Ramistr. 100, CH-8091 Zurich, Switzerland). *Endoscopy* 8(1):5-9; 1976.

The clinical findings in 20 patients with the Mallory-Weiss syndrome (MWS) are presented, and the incidence, the basal and pentagastrin-stimulated acid secretion, and the results of esophageal manometry were studied. During a 4.5-yr period, MWS was responsible for 8% of a total of 247 acute upper gastrointestinal hemorrhages. The ratio of male to female patients was 17 to 3. All 20 patients had hematemesis, and all patients were treated with ice water lavage. Three patients received vasopressin, i.v., and four patients required surgery. Two patients died postoperatively, and five others died 2-9 months after the hemorrhage from concomitant disease. The diagnosis was made endoscopically in all cases. The lesion could not be detected radiologically. There was a history of vomiting in 12 patients. In two patients, severe coughing preceded the bleeding, and six patients had a history of alcohol abuse. The measurement of pentagastrin-stimulated acid secretion in 11 patients revealed subnormal or no acid secretion in 4 patients (1, vagotomy after operation for MWS; 2, gastrectomies); hyperacidity was found in a further patient. Esophageal manometry could be carried out in 10 patients. The lower esophageal sphincter pressure was normal (25 ± 5 mm Hg) in four patients, slightly below normal in three, and elevated in three. The results suggest that the prognosis for MWS patients is generally favorable; mortality from bleeding is only 10% and surgery is required only when conservative treatment (e.g., vasopressin infusion and Sengstaken-Blakemore tube) fails.

7973 HYPERGASTRINAEMIA AND OESOPHAGEAL STENOSIS. (Eng.) Pedrazzoli, S.; Favretti, F.; Brandtetter, S.; Militello, C.; Dodi, G.; Lise, M. (Clinica Chirurgica Generale dell'Universita di Padova, Padova, Italy). *Surg. Italy* 5(3):168-174; 1975.

Serum gastrin estimations were carried out in 15 patients with esophageal stenosis to determine whether hypergastrinemia is associated with the altered esophageal motility. The mean gastrin level in these patients was 92.1 pg/ml, which was significantly higher than that in 15 controls (33.9 pg/ml, $p<0.001$). No significant differences in gastrin level were found when the 15 patients were subdivided according to the type of stenosis (neoplastic or non-neoplastic), the site of stenosis (middle or lower third and cardia), and the severity of dysphagia; the mean gastrin level in each group was significantly higher than that in the controls. A preoperative gastric histamine-acidogram, obtained in four patients, revealed histamine-resistant achlorhydria in two patients and acid secretion in the upper limit of normal in the other two. The authors suggest that vagal stimulation, caused by esophageal distension above the stenosis, may be responsible for the high gastrin levels in these patients.

7974 ACHALASIA OF THE ESOPHAGUS. RESULTS AND SEQUELAE OF SURGICAL TREATMENT. (Fre.) Ribet, M.; Callafe, R.; Hamon, Y. (Clinique Chirurgicale Ouest, C.H.U., 59000 Lille, France). *Arch. Fr. Mal. App. Dig.* 64(8):629-637; 1975.

7975 RADIOGRAPHIC AND ENDOSCOPIC EFFECTS OF PRIMARY ADENOCARCINOMA OF THE ESOPHAGUS. (Fre.) Dupas, J.-L.; Capron, J.-P.; Gontier, M.-F.; Lorriaux, A. (Centre Hospitalier Universitaire, place Victor-Pauchet, 80030 Amiens Cedex, France). *Ann. Gastroenterol. Hepatol.* 12(1):39-46; 1976.

7976 ERRORS IN THE DIAGNOSIS OF ESOPHAGEAL CANCER. (Rus.) Stolyarov, V. I.; Kolosov, A. E.; Trishkin, V. A. (N. N. Petrov Scientific Res. Inst. Oncology, Leningrad, USSR). *Vestn. Khir.* 116 (4):135-138; 1976.

7977 PULMONARY COMPLICATIONS OF THE SLIDING TYPE OF HIATAL HERNIA. (Fre.) Favre, J. P.; Viard, H.; Belsey, R. (Hopital du Bocage, 21000 Dijon, France). *Ann. Chir.* 30(3):215-218; 1976.

7978 ENDOSCOPIC DIAGNOSIS AND SURGICAL THERAPY WITH CARDIOMYOTOMY IN THE MALLORY-WEISS SYNDROME. (Ger.) Mattes, P.; Probst, M. (Abteilung fur Allgemeine Chirurgie des Departments fur Chirurgie der Universitat, Steinhovelstrasse 9, D-7900 Ulm, W. Germany). *Chirurg* 47(2):79-82; 1976.

ESOPHAGUS

7979 PERFORATION OF THE ESOPHAGUS BY GASTRIC TUBES. (Ger.) Imig, H.; Molzberger, H.; Stucker, F. J. (Chirurgische Universitatsklinik, Joseph-Stelzmann-Strasse 9, D-5000 Koln 41, W. Germany). *Leber Magen Darm* 6(1):33-37; 1976.

7980 NEW THERAPEUTIC APPROACH TO CORROSION OF THE UPPER DIGESTIVE TRACT. (Fre.) Di Costanzo, J.; Jouglard, J.; Chauvin, G.; Noirclerc, M.; Escoffier, J.-M.; Gauthier, A. (Service d'Hepato-Gastro-Enterologie, 270, boulevard de Sainte-Marguerite, F 13274 Marseille Cedex 2, France). *Arch. Fr. Mal. App. Dig.* 64(8):706; 1975.

7981 TECHNIQUE OF SUBMUCOUS SCLEROSING IN PATIENTS WITH BLEEDING ESOPHAGEAL VARICES—THERAPEUTIC RESULTS. (Ger.) Kronberger, O.; Schna H.; Vyslonzil, E. (I. Medizinische Abteilung und HNO-Ambulatorien des Wilhelminenspitals Wien, 16, Montleartstrasse 37, A-1171 Wien, Austria). *Leber Magen Darm* 6(1):38-42; 1976.

See also, 7680, 7738, 7931, 7933, 7935, 7936, 8021,
8036, 8384.

STOMACH

7982 POSTRESECTIONAL ANEMIA. A PREVENTABLE COMPLICATION OF TOTAL GASTRECTOMY. (Eng.) Bradley, E. L., III; Isaacs, J. (Emory Univ. Sch. Medicine, 69 Butler St. SE, Atlanta, GA 30303). *Arch. Surg.* 111(8):844-848; 1976.

Nutritional and hematologic parameters were investigated in 10 patients after total gastrectomy for complications of peptic ulcer without malignancy. Controlled balance studies were conducted during hospitalization at an average of 32 months after surgery and compared with findings after initial discharge. Even during hospitalization, 3 patients had an iron intake less than 85% of the recommended dietary allowance, and 9 of 10 had insufficient folic acid intake. Seven of ten had mild nitrogen malabsorption, but only two were in negative nitrogen balance during hospitalization. Lesser amounts of each dietary constituent, with the exception of folic acid and B_{12}, were taken in after return home, but aside from the apparent universal tendency for insufficient folic acid intake, no pattern of intake deficiency was determined. Seven of the ten were anemic in terms of decreased circulating RBC. Macrocytosis was seen in five, three of whom also had abnormally low numbers of circulating RBC. Iron deficiency was present in three. Of five patients studied during the 1st postoperative yr, four had either anemia or sideropenia, while four of five studied after the 1st postoperative yr failed to show any abnormalities in iron metabolism. One case of hemoglobinopathy was observed (hemoglobin A 66%-C 33%). Serum B_{12} levels were normal in nine, and one patient with low serum B_{12} showed clinical manifestations of B_{12} deficieny. Serum folate levels were low in three patients, but only one of these had evidence of a maturation abnormality. All ten patients exhibited malabsorption of orally administered cyanocobalamin, even when sufficient exogenous intrinsic factor was given. Reticulocytosis was not evident in eight, and only two were capable of a reticulocyte response to low numbers of circulating RBC. Erythropoietin levels were normal in five and increased in five, suggesting that an adequate stimulus for RBC production was being given to the marrow. It is concluded that postresectional anemia is mult causal, but that it is primarily nutritional.

7983 EARLY GASTRIC CARCINOMA. (Eng.) Rowland R.; Hecker, R.; Fitch, R. J.; Gibson, G. E.; Willing, R.; Jennings, W. L. (Inst. Medical and Veterinary Science, Frome Road, Box 14, Rundle St. P.O., Adelaide, South Australia 5000). *Aust. N.Z. J. Surg.* 45(4):349-354; 1975.

Seven cases of early gastric carcinoma (lesion confined to the mucosa or submucosa only) are reported Recent significant weight loss was reported by thre patients, but dyspepsia had been present for 18 months to 25 yr. Histories were indistinguishable from that of peptic ulcer. Barium meal studies wer conducted in all seven cases. Gastric ulceration was revealed in six cases, and the possibility of gastric carcinoma was raised in two cases. In thre of the six in whom endoscopy was performed, the gastric ulcers appeared benign, and in the other three there was suspicion of malignancy. In six cases, the ulcer was situated near the lesser curvature. Endoscopic biopsy revealed malignancy in all six, but a second biopsy was necessary in one patient. All patients underwent partial gastrectomy (five Billroth I and two Polya-type gastrectomies). Ther was no recurrence after follow-up of 3 to 36 months The histologically identified tumor patterns were extremely variable and included signet ring cell, colloid, undifferentiated, and well and moderately differentiated adenocarcinoma. The muscularis mucosa was invaded in four cases, but no vascular invasion was seen. The good results of early surgery are emphasized.

7984 A CONTROLLED CLINICAL TRIAL OF FLUOROURACIL PLUS IMIDAZOLE CARBOXAMIDE DIMETHYL TRIAZENO PLUS VINCRISTINE PLUS BIS-CHLOROETHYL NITROSOUREA PLUS RADIOTHERAPY IN STOMACH CANCER. (Eng Falkson, G.; Van Eden, E. B. (H.F. Verwoerd Hosp., P/Bag x169, Pretoria 0001, South Africa). *Med. Pediatr. Oncol.* 2(2):111-117; 1976.

Two regimens of combination chemotherapy and radiotherapy were compared in 59 evaluable, randomly allocated patients with inoperable or recurrent adenocarcinoma of the stomach. Group A patients received 5-fluorouracil (12.5 mg/kg/d x 5, i.v.) and group B patients received a four drug combination: 5-fluorouracil (10 mg/kg/d x 5, i.v.), 5-(3,3-dimethyl-1-triazeno)imidazole-4-carboxamide (DIC, 3 mg/kg/day x 2, i.v.), vincristine (0.025 mg/kg x 1, i.v.), and 1,3-bis(2-chloroethyl)-1-nitrosourea (1.5 mg/kg x 1, i.v.). Courses of treatment were repeated at 5-week intervals. Radiotherapy consisted of 2,000 rads ^{60}Co in 12 days, beginning on the first day of chemotherapy. Beginning on the first day of the second through the fifth course of chemotherapy, an additional 1,200 rads was administered. No life-threatening toxicity was encountered on either regimen. Toxic effects among group A patients included nausea (19), vomiting (11), diarrhea (9), stomatitis (14), fall in Hb (8), leukopenia (19), thrombocytopenia (10), and alopecia (1). Toxicity in group B patients included nausea (26), vomiting (21), diarrhea (3), stomatitis (1), fall in Hb (12), leukopenia (23), thrombocytopenia (16), and alopecia (universal). Seventeen of 31 group A patients and 10 of 28 group B patients had an objective response, while 10 group A and 7 group B patients remained unchanged. The median survivals for groups A and B were 220 and 199 days, resp. The median survival for group A responders was 222 days, compared with 410 days for group B responders. The survival times for responders plus those who did not change were 245 days for group A and 297 days for group B patients. It is concluded that with a larger group of patients, allowing for more adequate stratification, definite advantage for the four drug combination might be shown.

7985 PROBLEMS IN THE DIAGNOSIS OF PRIMARY GASTRIC STUMP CANCER AND RECURRENCES OF GASTRIC CANCER. A COMPARISON OF RADIOLOGICAL AND ENDOSCOPIC DIAGNOSIS. (Ger.) Kriedemann, E.; Rotte, K. H.; Mateev, B.; Gutz, H. J. (Zentralinstitut fur Krebsforschung der AdW der DDR-1115 Berlin-Buch, Lindenberger Weg 80, E. Germany). *Arch. Geschwulstforsch.* 45(6):552-565; 1975.

Gastroscopic and radiological findings in 13 cases of primary gastric stump carcinoma and 17 cases of its recurrence were compared. In gastric stump carcinoma radiology, seven malignancies, five questionable outcomes, and one benignity were identified. Endoscopy of the same sample found 10 malignancies, 2 doubtful results, and 1 benign process. In recurrence studies by radiology, eight malignancies, six questionable results, and three benign tumors were diagnosed, while endoscopy found eight malignancies, three doubtful diagnoses, and six benign tumors. The principal tumor site was the residual stomach, especially along the lesser curvature. The uncertain or false-negative radiological diagnoses involved tumors of the residual stomach and the anastomosis; questionable or false-negative endoscopic outcomes involved premature stenosis in the cardia or on the anastomosis. Both methods were mutually supplementary. Suspicious or controversial radiological findings are generally confirmed by gastroscopy and biopsy.

7986 MULTIPLE CARTILAGINOUS EXOSTOSES WITH POLYPOSIS OF STOMACH AND COLON: A NEW, HEREDITARY COMBINATION DIFFERENT FROM GARDNER'S SYNDROME. (Ger.) Fuchs, G. A. (Medizinische Fakultat der Technischen Hochschule, 51 Aachen, Goethestr. 27/29, W. Germany). *Dtsch. Med. Wochenschr.* 100(45):2316-2319; 1975.

The association of multiple cartilaginous exostoses and intestinal polyps in one family is reported. Two brothers, 11 and 15 yr of age, presented with epiphyseal-adjacent exostoses of the upper and lower limbs. The father had previously had a right tibial tumor, which was thought to be an interosseal exostosis. Physical examination of the boys found various skeletal anomalies in one proband with acromegaloid habitus. Urinary steroids were normal. Colon radiology found extensive sigmoid polyposis in the siblings, but none in the father. Gastric polyps (antral) were also found in the older brother. The polyposis was clinically silent. Gene analysis was not attempted; but, because of the rarity of the skeletal-gastrointestinal combination, a separate clinical entity based on linked dominant transmission is suggested.

7987 BILE REFLUX GASTRITIS: CONTRIBUTION OF INADEQUATE GASTRIC EMPTYING. (Eng.) Davidson, E. D.; Hersh, T. (Emory Univ. Clinic, 1365 Clifton Road NE, Atlanta, GA 30322). *Am. J. Surg.* 130(5):514-518; 1975.

The clinical response of 22 patients with bile reflux gastritis who had undergone operative therapy from 1973-1975 is reported. The original operation comprised vagotomy, resection, and Billroth II reconstruction in 16 patients; vagotomy, resection, and Billroth I reconstruction in 5 patients; and vagotomy-pyloroplasty in 1. Twenty-one patients underwent Roux-en-Y gastrojejunostomy and one underwent isoperistaltic jejunal interposition. Pre- and postoperatively, seven patients had clinically significant gastric atony, producing a delay in gastric emptying along with bile reflux gastritis. In the Billroth II group, 8/16 patients had a good response to operation (amelioration of symptoms and weight gain), 5 had a fair response (decrease in abdominal pain and nausea), and 3 had a poor response. Of the Billroth I patients, only one had a good result; the remaining five continued to have some gastrointestinal symptoms and had documented gastric atony and stasis. Treatment with metoclopramide resulted in an amelioration of symptoms in two patients. The pyloroplasty patient had a poor result. It is concluded that a good clinical response is obtained from the diversion of bile in patients with bile reflux gastritis who do not have significant alterations in gastric emptying. Patients with altered motility and delayed emptying experience little improvement.

7988 ANGIOGRAPHIC METHODS FOR THE CONTROL OF GASTRIC HEMORRHAGE. (Eng.) Athanasoulis, C. A. (Massachusetts General Hosp., Fruit St., Boston, MA 02114). *Am. J. Dig. Dis.* 21(2):174-181; 1976.

Angiographic methods for the control of gastric bleeding are reviewed, and the indications and possible problems that may be encountered during their application are discussed. There are two basic methods for the angiographic control of gastric bleeding: the intraarterial infusion of vasoconstricting drugs and the occlusion of the bleeding artery by embolization. The most important artery in the bleeding patient is the left gastric artery. Among 35 patients with gastric hemorrhage and an arteriogram showing definite contrast extravasation, the left gastric artery was the bleeding vessel in 29, the right gastric artery in 3, a short gastric artery in 2, and the gastroduodenal artery in 1. Vasopressin is the drug of choice in controlling gastric bleeding. For optimal results, it should be infused into the left gastric artery; when this is not possible, the celiac axis is an alternative. Hemorrhage was controlled in 82% of patients treated with vasopressin. The complication rate of arterial thrombosis at the puncture site is no higher than that in patients undergoing visceral angiography (0.02%). Arterial occlusion of the bleeding artery has been carried out using unmodified autologous clot or autologous clot with additives such as oxidized cellulose, aminocaproic acid, thrombin, or surgical gelatin. Transcatheter occlusion should be used cautiously, when an adequate collateral blood supply exists; it should not be used in conjunction with vasopressin infusions, because this may produce infarction. The author suggests that vasopressin infusion should be applied first, and if this fails to control bleeding, embolization should be considered.

7989 THE ENDOSCOPIC DIAGNOSIS OF UPPER-GASTROINTESTINAL HEMORRHAGE: CHANGING CONCEPTS OF ETIOLOGY AND MANAGEMENT. (Eng.) Katz, D.; Pitchumoni, C. S.; Thomas, E.; Antonelle, M. (120 East Prospect St., Mount Vernon, NY 10550). *Am. J. Dig. Dis.* 21(2):182-189; 1976.

Changes in the concepts of the etiology of upper gastrointestinal hemorrhage were evaluated in 1,429 patients who underwent upper gastrointestinal endoscopy between 1961 and 1974. Changes in the technique between 1961 and 1974 are described, the management is discussed, and the changing concepts in the etiology of gastrointestinal hemorrhage in other studies are reviewed. Preparation for endoscopy with ice water lavage, which was used routinely in 1961, is no longer used; aspiration alone is now used, and lavage is used only with continued massive bleeding. While endoscopy was performed within hours of admission in 1961, it is now performed only within the first 24 hr. Panendoscopes now allow the examination of the entire upper gastrointestinal tract through the duodenal bulb. Traditional barium swallow is no longer considered essential, while selective angiography is performed in endoscopically undiagnosed cases with continued bleeding. Among the 1,429 cases, acute gastric mucosal lesions (acute erosive gastritis and acute gastric ulcer) were the source of bleeding in 36.3% of episodes, while the etiology in 21.4% was chronic peptic ulcer (chronic duodenal, chronic gastric, and marginal ulcer). Bleeding esophageal varices were seen in 15.7% of the cases, miscellaneous diagnoses were established in 12.7% of the cases, and 13.9% of the cases remained undiagnosed. An analysis of the most recent 150 cases (1972-1974), utilizing only panendoscopes, demonstrated an upward shift of acute mucosal lesions (accounting for 54.1% of the cases) and a reciprocal downward shift of the incidence of chronic peptic ulcers (11.3%). This is explained by the diagnosis of acute duodenitis in cases once thought to be bleeding from chronic duodenal ulcer. A review of the literature reveals that the incidence of duodenal ulcer is relatively low compared to that noted 20 yr ago. Acute mucosal lesions, which were largely unrecognized 15 yr ago, now rank as one of the two major bleeding sources in all series.

7990 THE EFFECT OF ACUTE HYPERGLYCEMIA ON GASTRIC EMPTYING IN MAN. (Eng.) MacGregor, I. L.; Gueller, R.; Watts, H. D.; Meyer, J. H. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Gastroenterology* 70(2):190-196; 1976.

The effects of acute hyperglycemia on the gastric evacuation of a variety of test meals were studied in normal human subjects. Hyperglycemia was accomplished by both high- and low-load doses of i.v. glucose: 150 mg/kg as an initial bolus, followed by a constant i.v. infusion of either 5 mg/kg/min (low load) or 10 mg/kg/min (high load). The time course of plasma glucose revealed that with both loads of glucose, the blood sugar concentration began to fall after 45 min and was near fasting levels at 105 min. The i.v. glucose infusions slowed the rate at which polyethylene glycol passed the sampling site, distal to the ligament of Treitz, after a protein-fat meal ($p<0.005$ for high glucose load and $p<0.025$ for low load). The mean $T_{1/2}$ of of gastric emptying was 39.6 min for saline controls, 56.8 min for the low-glucose load, and 70.9 min for the high-glucose load. Hyperglycemia did not significantly slow the gastric emptying of a hypertonic saline meal, but it did significantly slow the emptying of a 600 mOsm meal of milk powder digest. A 600 mOsm glucose meal was emptied at a significantly slower rate ($p<0.05$) than a 600 mOsm mannitol meal, with a $T_{1/2}$ of 29.2 and 20.1 min, resp. It is concluded that hyperglycemia does exert an effect on gastric emptying, but that the effect depends on the presence of other factors which themselves slow gastric emptying.

7991 RESPONSE TO PENTAGASTRIN IN MAN. IV. DOSE-RESPONSE CHARACTERISTICS. (Eng.) Thjodleifsson, B.; Wormsley, K. G. (Medical Dept., Landspitalinn, Reykjavik, Iceland). *Acta Hepatogastroenterol. (Stuttg.)* 23(2):124-130; 1976.

To determine the kinetics of the interaction of pentagastrin with gastric secretory cells, the effects of different doses of i.v.-administered pentagastrin on gastric secretion were studied in seven subjects. The secretion of acid took up to 30 min to reach peak values during a constant rate infusion of pentagastrin (0.01, 0.5, 0.2, 1.0, or 4.0 μg/kg/hr). Consequently, both the observed and calculated maximal responses during the second 30 min of the infusions of pentagastrin were greater than during the initial 30 min. When the doses of pentagastrin were given sequentially (30 min/dose), the observed peak responses to the step test were identical with the second 30-min response to the single infusions. This is thought to be due to the lower dose rates in the step test acting as priming doses. The response to the two lowest doses of the step test were similar to the response during the first 30 min of the infusion of the single dose rates of pentagastrin, so that both the ED_{50} and the calculated maximal response for pentagastrin estimated from the step test were greater than those calculated from the single-dose infusions. The results emphasize the importance of recognizing factors that may distort the values of the calculated indices of the secretory responses to pentagastrin.

7992 ULCER SIMULATING GASTRIC CARCINOMA. II. HISTOPATHOLOGY AND SURVIVAL. (Eng.) Sipponen, P.; Hakkiluoto, A.; Lempinen, M. (Univ. Central Hosp., Haartmaninkatu 4, 00290 Helsinki 29, Finland). *Ann. Chir. Gynaecol. Fenn.* 64(1):10-17; 1975.

Histological specimens of 48 gastric carcinomas that simulated benign ulcers were reexamined to determine the depth of invasion of malignant cells, and the survival rates for gastric carcinomas invading different areas were compared. Twenty-two of the 48 benign ulcer-simulating carcinomas were adenocarcinomas, 15 were mucocellular, and 11 were anaplastic poorly differentiated forms. In 20 cases, the carcinoma fulfilled the criteria for early gastric cancer and did not extend beyond the mucosa or submucosa of the gastric wall. The 5-yr survival rate in the entire series was 63%. Among those in whom the cancer was limited to the mucosa or submucosa, the 5-yr survival was 77%, but in the advanced cancers it was only 52%. The mucocellular type had a 77% 5-yr survival, while the adenocarcinomas had a 5-yr survival of 49%. Gastric carcinomas simulating benign ulcers have the same histological types as primary gastric carcinomas. The good prognosis in these cases is attributed to the high percentage of early carcinoma.

7993 SMOOTH MUSCLE TUMORS OF THE STOMACH. (Eng.) Welch, J. P. (Womack Army Hosp., Box 87-H, Fort Bragg, NC 28307). *Am. J. Surg.* 130(3):279-285; 1975.

7994 GASTRITIS. (Eng.) Seaman, W. B. (Coll. Physicians and Surgeons, Columbia Univ., New York, NY). *Radiology* 113(2):485-486; 1974.

7995 GASTRODUODENAL ULCERS IN CHILDREN: A STUDY OF 26 CASES. (Fre.) Dieterlen, M.; Marchal, A.; Bost, M.; Tachker, D.; Sandor, C.; Roget, J. (Centre Hospitalier Regional, La Tronche, Grenoble, France 38). *Pediatrie* 30(2):129-135; 1975.

7996 TUNNEL ULCER WITH DOUBLE PYLORIC CANAL. (Eng.) Engle, R. B. (St. Luke Hosp., Pasadena, CA 91107). *Radiology* 116(2):323-324; 1975.

7997 EFFECTS OF PYRIDOXINE ON MICE AFTER IMMOBILIZATION STRESS. (Eng.) Lindenbaum, E. S.; Mueller, J. J. (Aba Khoushy Sch. Medicine, Haifa, 12 Haaliya St., Bat Galim, POB 9649, Haifa, Israel). *Nutr. Metabol.* 17(6):368-374; 1974.

7998 A REVIEW OF RECENT THERAPEUTIC APPROACHES TO TREATMENT OF STRESS ULCERS. (Eng.) Romero, R.; Butterfield, W. C. (St. Mary's Hosp., Waterbury, CT 06702). *Rev. Surg.* 52(6):379-388; 1975.

7999 EFFECTS OF ACETYLSALICYLIC ACID (ASA) PLUS L-GLUTAMINE AND L-GLUTAMINE ON HEALING OF CHRONIC GASTRIC ULCER IN THE RAT. (Eng.) Okabe, S.; Takeuchi, K.; Honda, K.; Takagi, K. (Dept. Chemical Pharmacology, Univ. Tokyo, Hongo Bunkyo, Tokyo 113, Japan). *Digestion* 14(1):85-88; 1976.

8000 CONGENITAL HYPERTROPHIC PYLORIC STENOSIS IN SUDANESE CHILDREN. (Eng.) Hassan, M. M.; Bayomi, A. (Khartoum Hosp., Khartoum, Sudan). *Environ. Child Health* 214(4):180-182; 1975.

8001 PLASMA GASTRIN IN CONGENITAL HYPERTROPHIC PYLORIC STENOSIS: A HYPOTHESIS DISPROVED? (Eng.) Rogers, I. M.; Drainer, I. K.; Moore, M. R.; Buchanan, K. D. (Stobhill General Hosp., Glasgow, Scotland). *Arch. Dis. Child.* 50(6):467-471; 1975.

8002 GASTRIC OUTLET OBSTRUCTION DUE TO X-LINKED CHRONIC GRANULOMATOUS DISEASE. (Eng.) Johnson, F. E.; Humbert, J. R.; Kuzela, D. C.; Todd, J. K.; Lilly, J. R. (Univ. Colorado Medical Center, Denver, CO 80220). *Surgery* 78(2):217-223; 1975.

8003 MALLORY-WEISS SYNDROME: CHARACTERIZATION OF 75 MALLORY-WEISS LACERATIONS IN 528 PATIENTS WITH UPPER GASTROINTESTINAL HEMORRHAGE. (Eng.) Knauer, C. M. (Santa Clara Valley Medical Center, 751 South Bascom Ave., San Jose, CA 95128). *Gastroenterology* 71(1):5-8; 1976.

8004 ACID AND GASTRIN LEVELS AFTER BOMBESIN AND CALCIUM INFUSION IN PATIENTS WITH RETAINED ANTRAL MUCOSA [Abstract]. (Eng.) Basso, N.; Lezoche, E.; Giri, S.; Materia, A.; Speranza, V. (Istituto di Patologia Speciale Chirurgica III dell'Universita, Roma, Italy). *Rend. Gastroenterol.* 7(3):249; 1975.

8005 EFFECTS OF VARIOUS AMINO ACIDS ON GASTRIC LESIONS INDUCED BY ACETYLSALICYLIC ACID (ASA) AND GASTRIC SECRETION IN PYLORUS-LIGATED RATS. (Eng.) Okabe, S.; Takeuchi, K.; Honda, K.; Takagi, K. (Dept. Chemical Pharmacology, Univ. Tokyo, Bunkyo-ku, Tokyo, Japan). *Arzneim. Forsch.* 26(4):534-537; 1976.

8006 A TRANSMISSION AND SCANNING ELECTRON MICROSCOPIC STUDY ON THE ATYPICAL EPITHELIAL LESIONS OF THE STOMACH. (Eng.) Ogata, T.; Murata, F.; Takata, M.; Kibayashi, H.; Moriyasu, K.; Imajo, K.; Nishie, Y.; Tokumaru, I.; Hoshijima, A.; Seito, T.; Tanaka, S. (Okayama Univ. Medical Sch., Okayama, Japan). *J. Clin. Electron Microsc.* 6(3/4):308-309; 1973.

8007 ON THE BETA-ADRENERGIC CONTRIBUTION TO THE GASTRIC ACID AND GASTRIN RESPONSES TO HYPOGLYCAEMIA IN MAN. (Eng.) Christensen, K. C.; Stadil, F. (Rigshospitalet, 2100 Copenahagen, Denmark). *Scand. J. Gastroenterol.* 11(37):81-86; 1976.

8008 EROSIVE GASTRITIS DUE TO INGESTED BATTERY ACID. (Eng.) Burman, J. H.; Grave, G. F. (Mpilo Central Hosp. Bulawayo, Rhodesia). *S. Afr. J. Surg.* 13(2):123-125; 1975.

8009 PYLORIC REFLUX GASTRITIS. (Eng.) Broadie, T. A.; Delaney, J. P. (Univ. Minnesota Medical Sch., Minneapolis, MN). *Surg. Forum* 24:372-374; 1973.

8010 SIMULTANEOUS DUODENOCOLIC AND GASTROCOLIC FISTULAS. (Eng.) Riesenfeld, G.; Gellei, B. (Rothschild Univ. Hosp., Aba Khoushy Sch. Medicine, P.O. Box 4940, Haifa, Israel). *Int. Surg.* 60(8):420-422; 1975.

8011 MEMBRANOUS GLOMERULONEPHRITIS: AN INITIAL SYMPTOM OF GASTRIC CARCINOMA? (Eng.) Weintroub, S.; Stavorobsky, M.; Griffel, B. (Ichilov Hosp., Tel Aviv, Israel). *Arch. Surg.* 110(7):833-838; 1975.

8012 SOLITARY BONY METASTASIS AS THE FIRST SIGN OF MALIGNANT GASTRIC TUMOR OR OF ITS RECURRENCE. (Eng.) Birla, R. K.; Bowden, L. (Memorial Sloan Kettering Cancer Center, New York, NY). *Ann. Surg.* 182(1):45-49; 1975.

8013 GASTRIC TERATOMA: REPORT OF A CASE AND A REVIEW OF THE LITERATURE. (Eng.) Morrison, L.; Snodgrass, P.; Wiseman, H. (Bowman-Gray Sch. Medicine, Winston-Salem, NC 27103). *Clin. Pediatr.* 14(8):712-718; 1975.

8014 GASTRIC CARCINOMA. A PROSPECTIVE STUDY OF TUMOR DIFFERENTIATION CORRELATED TO SURGICAL PROCEDURES AND SURVIVAL RATE. (Eng.) Tonnesen, K.; Fischerman, K.; Norgaard, T.; Olsen, J. (Rigs pitalet, DK-2100 Copenhage, Denmark). *Scand J. Ga troenterol.* 11(37):107-110; 1976.

8015 INCIDENCE OF STOMACH CANCER AND ITS RELATION TO DIETARY HABITS AND NUTRITION IN JAPAN BETWEEN 1900 AND 1975. (Eng.) Oiso, T. (International Medical Foundation Japan, Tokyo, Japan *Cancer Res.* 35(11):3254-3258; 1975.

8016 CANCER BY COUNTY: NEW RESOURCE FOR ETIO LOGIC CLUES. (Eng.) Hoover, R.; Mason, T. J.; McKay, F. W.; Fraumeni, J. E., Jr. (Epidemi logy Branch, Natl. Cancer Inst., Natl. Inst. Healt Bethesda, MD 20014). *Science* 189(4207):1005-1007; 1975.

8017 THE EFFECT OF METOCLOPRAMIDE ON GASTRIC EMPTYING. (Eng.) Sethbhakdi, S.; Sricharoen, V.; Wilairatana, S. (Univ. Pennsylvania Medical Center, 51 N. 39th St., Philadelphia, PA 19104). *Am. J. Proctol.* 26(5):51-59; 1975.

8018 THE RELATIONSHIP OF ANAEMIA TO GASTRIC SE CRETION MORE THAN 15 YEARS AFTER VAGOTOM AND GASTRO-ENTEROSTOMY. (Eng.) Wheldon, E. J.; Venables, C. W.; Johnston, I. D. A. (Univ. Newcastl Upon Tyne, Royal Victoral Infirmary, Newcastle Upo Tyne, England). *Br. J. Surg.* 62(5):356-359; 1975.

8019 PYLOROMYOTOMY: DOES SURGERY IN INFANCY INCREASE ALLERGY? (Eng.) Ballantine, T. V. N.; Tapper, D.; Mueller, H.; Smith, R.; Folkman, J. (John Whitcomb Riley Hosp. for Children, 1100 W. Michigan St., Indianapolis, IN 46202). *Pediatrics* 56(3):404-406; 1975.

8020 DIAGNOSTIC PERITONEAL LAVAGE IN BLUNT ABDOMINAL TRAUMA. (Eng.) Engrav, L. H.; Benjamin, C. I.; Strate, R. G.; Perry, J. F., Jr. (Univ. Kansas Medical Center, Kansas City, KS 6610 *J. Trauma* 15(10):854-859; 1975.

8021 ABDOMINAL SURGERY (FIRST OF THREE PARTS). (Eng.) Welch, C. E. (Suite 1104, 275 Charles St., Boston, MA 02114). *N. Engl. J. Med.* 293(17):858-863; 1975.

8022 A CONTRIBUTION TO THE KNOWLEDGE OF THE S CALLED PYLORIC BAND ("DOUBLE PYLORUS"). (Eng.) Kreinsen, U.; Kammerer, W.; Dohnert, G. (Pathologisches Inst. der Universitat, D-6900 Heidelberg 1, Im Neuenheimer Feld 220/221, W. Germany *Virchows Arch.* [*Pathol. Anat.*] 367(2):163-170; 197

See also, 7728, 7736, 7768, 7889, 7931, 7932, 7934
7738, 7940, 7943, 7979, 7980, 8034, 8037
8038, 8040, 8080, 8225, 8332, 8372, 8373
8377, 8378, 8379, 8383, 8384, 8386.

Peptic Ulcers

8023 COMPARATIVE STUDY OF THE HOSPITAL TREATMENT OF DUODENAL ULCER UNDER ENDOSCOPICAL PROGRESS CONTROL--WITH AND WITHOUT MEDICINAL SUPPORT. (Ger.) Mittelstaedt, A.; Schwick, M. (Dept. Gastroenterologie der Inneren Abt., Augusta-Krankenhaus, Amalienstrasse 9, 4 Dusseldorf-Rath, W. Germany). *Fortschr. Med.* 94(20/21):1183-1189; 1976.

The therapeutic effect of a preparation whose active principle is deglycyrrhizinated liquorice (Caved-S) on duodenal ulcers was analyzed. Group A consisted of 15 patients receiving two tablets of Caved-S daily four times during an initial 7-day period, followed by two tablets per day three times during the next 3 weeks. Group B consisted of 15 patients receiving a commercial antacid. Fifteen patients in group C received a placebo. The doses for groups B and C followed that of group A. No patient was hyperchlorhydric, but 30% presented with concurrent gastritis. All pretreatment ulcers were in florid stages I or II. After 2 weeks, 14 patients in group A, 13 in group B, and 13 in group C showed subjective improvement, particularly in epigastric pain. Of these, three in group A and one in group B were completely asymptomatic. After 4 weeks, 13 in group A, 11 in group B, and 10 in group C, were free of complaint, while the remainder were improved. Endoscopically, 10 in group A, 9 in group B, and 7 in group C had either significantly reduced ulcers or disappearance of wall defects at the end of 2 weeks. After 4 weeks, 12 patients in group A, 10 in group B, and 9 in group C were completely healed, with well-developed cicatrices; the remainder showed significant ulcer regression. The curative curve of gastritis followed that for duodenal ulcers. Weight gain was not associated with water retention. The serum sodium, potassium, and calcium levels were not affected, and the blood pressure was unchanged. Thus, the healing rate of duodenal ulcer patients was slightly better than those who had been treated with antacids and significantly better than those patients who had been given small quantities of antacids later on. Hospitalization alone leads to ulcer healing in over 60% of the cases, which excludes the evidence of an influence of drugs.

8024 CLINICAL COURSE OF PEPTIC ULCER AND THE EFFECT OF PHARMACOTHERAPY: MULTI-INSTITUTIONAL DOUBLE-BLIND CONTROLLED STUDY. (Eng.) Yamagata, S.; Ishimori, A.; Sato, H.; Taneda, T.; Ishihara, K.; Tohei, N.; Masuda, M.; Kawai, K.; Hara, Y.; Konishi, K.; Ashizawa, S.; Nakano, H.; Fukuchi, S.; Okabe, H.; Tsuneoka, K.; Saito, Y.; Takemoto, T.; Kurokawa, K.; Niwa, H.; Kaneko, E.; Masuda, H.; Wada, T.; Sato, K.; Ogawa, N. (Tohoku Univ. Sch. Medicine, Seiryo-machi 1-1 Sendai, 980 Japan). *Gastroenterol. Jpn.* 10(4):323-341; 1975.

Comparative double-blind clinical trials were carried out in a series of 302 cases of gastric ulceration at 15 medical institutions to investigate the clinical course of peptic ulceration and the effect of N-acetyl-L-glutamine aluminum complex (KW) on this process; 213 patients completed the study. The effect of KW was compared with that of basic aluminum sucrose sulfate (UL) and of a placebo (lactose). There was a significantly higher cure rate (ulcer healing) among the inpatients (82.9%) than among the outpatients (56.7%) after 12 weeks of treatment with placebo. The cure rate for lesions in the corpus ventriculi (24.3%) was higher at 4 weeks of therapy than that of lesions at the gastric angle (9.4%); this was also true at 8 weeks (59.5% versus 40.6%) and at 12 weeks (81.1% versus 59.4%). Cumulative analysis of therapeutic responses up to 4, 8, or 12 weeks was carried out in 70 patients receiving KW (700 mg x 8/day), 74 patients receiving UL (720 mg x 8/day), and 69 cases receiving placebo. The cure rate at 12 weeks was 85.7% for the patients receiving KW, 85.1% for those receiving UL, and 71.0% for those receiving placebo. The KW cure rate was significantly higher than that of placebo ($p=0.028$) but not UL. The UL cure rate was significantly different from placebo ($p=0.032$). The difference in efficacy of these two treatments may reflect different pharmacologic actions.

8025 THE INCOMPETENT PYLORIC SPHINCTER: BILE AND MUCOSAL ULCERATION. (Eng.) Rovelstad, R. A. (Mayo Clinic, Rochester, MN 55901). *Am. J. Dig. Dis.* 21(2):165-173; 1976.

8026 TENSION PNEUMOTHORAX FROM A PERFORATED GASTRIC ULCER. (Eng.) Nayak, I. N.; Lawrence, D. (St. Barnabas Medical Center, NJ). *Br. J. Surg.* 63(3):245-247; 1976.

8027 INTESTINAL METAPLASIA AND GASTRIC ULCER [Abstract]. (Eng.) Sancho-Poch, F. J.; Balanzo, J.; Vilardell, F. (No affiliation given). *Acta Hepatogastroenterol. (Stuttg.)* 22(6):423; 1976.

8028 GASTRO-INTESTINAL HAEMORRHAGE FROM PEPTIC ULCER: AN EVALUATION OF BLOODLESS TRANSFUSION AND EARLY SURGERY. (Eng.) Alexiu, O.; Mircea, N.; Balaban, M.; Furtunescu, B. (Babes Hosp., 50 Bd. Dimitrov, Bucharest 31, Rumania). *Anaesthesia* 30(5):609-615; 1975.

8029 ANTACIDS AND BLEEDING PROPHYLAXIS. (Eng.) McCaffrey, T. D., Jr.; Lilly, J. O. (Mahorner Clinic, 1520 Louisiana Ave., New Orleans, LA 70115). *Am. J. Dig. Dis.* 21(2):194-196; 1976.

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8031 A PROTEIN DIETARY SUPPLEMENT FOR THE SEVERE DUMPING SYNDROME. (Eng.) Alexander, H. C. (Roosevelt Hosp., New York, NY). *Surg. Gynecol. Obstet.* 141(6):863-866; 1975.

8032 POSTBULAR PEPTIC ULCERATION OF THE DUODENUM. (Eng.) Hines, J. R.; Geurkink, R. E.; Gordon, R. T. (No affiliation given). *Surg. Gynecol. Obstet.* 142(1):13-15; 1976.

8033 THE INFLUENCE UPON THE ENDOCRINE AND EXOCRINE SYSTEM IN THE GASTRIC ACID SECRETION AFTER MEDICAL VAGOTOMY FOR DUODENAL ULCER [Abstract]. (Eng.) Watanabe, Y.; Kato, K. (Sch. Medicine, Juntendo Univ., Japan). *Gastroenterol. Jpn.* 10(3):229; 1975.

8034 HEALING OF DUODENAL AND PREPYLORIC ULCERS AFTER SELECTIVE AND HIGHLY SELECTIVE VAGOTOMY. (Eng.) Holst-Christensen, J.; Hansen, O. H.; Pedersen, T. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 10(7):781-783; 1975.

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8036 PEPTIC ULCERATION AFTER ESOPHAGEAL RESECTION. (Eng.) Beal, J. M., ed. (No affiliation given). *Ill. Med. J.* 148(4):290-291, 294; 1975.

8037 NEW OBSERVATIONS ON THE ABSORPTION OF ^{47}Ca IN PATIENTS WITH PARTIAL GASTRECTOMY. (Eng.) Kocian, J.; Brodan, V. (Postgraduate Medical Inst., Budejovicka 800-A, 146 22 Prague-4, Czechoslovakia). *Digestion* 12(4/6):193-200; 1975.

8038 THE HEALING OF GASTRIC ULCERS BY ZINC SULPHATE. (Eng.) Frommer, D. J. (St. Vincent's Hosp., Darlinghurst, N.S.W. 2010, Australia). *Med. J. Aust.* 2(21):793-796; 1975.

8039 DUODENAL ULCER THERAPY WITH DEPOT SECRETIN [Abstract]. (Eng.) Demling, L.; Domschke, W.; Domschke, S.; Wunsch, E. (Dept. Medicine, Univ. Erlangen-Nurnberg, Erlangen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 23(1):74; 1976.

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8042 DEGLYCYRRHIZINIZED LIQUORICE IN THE TREATMENT OF CHRONIC DUODENAL ULCER: A RETROSPECTIVE ENDOSCOPIC SURVEY OF 32 PATIENTS. (Eng.) Larkworthy, W.; Holgate, P. F. L. (Royal Air Force Hosp., Nocton Hall, Nocton, Lincoln, England). *Practitioner* 215(1290):787-792; 1975.

8043 A BISMUTH-PEPTIDE COMPLEX IN THE TREATMENT OF DUODENAL ULCERATION: A DOUBLE-BLIND DUODENOSCOPIC STUDY. (Eng.) Moshall, M. G. (Univ. Natal and King Edward VIII Hosp., Durban, S. Africa). *S. Afr. Med. J.* 49(29):1157-1159; 1975.

8044 GASTRIN RESPONSE TO A PROTEIN MEAL IN CHILDREN WITH DUODENAL ULCER [Abstract]. (Eng.) Christie, D. L.; Ament, M. E. (UCLA Sch. Medicine, Los Angeles, CA 90024). *Pediatr. Res.* 10(4):353; 1976.

8045 DOSE RESPONSE RELATIONSHIPS TO TETRAGASTRIN STIMULATED GASTRIC SECRETION AND THE QUANTITATIVE FRACTIONATION OF GASTRIC PEPSIN [Abstract]. (Eng.) Yamada, S.; Sato, K. (Sapporo Medical Coll., Sapporo, Japan). *Gastroenterol. Jpn.* 10(3):230-231; 1975.

8046 GASTRIC SECRETION IN RELATION TO DUODENAL AND GASTRIC ULCER [Abstract]. (Eng.) Arima, K.; Yunoki, K. (Faculty of Medicine, Kagoshima Univ. Kagoshima, Japan). *Gastroenterol. Jpn.* 10(3):231; 1975.

8047 CORRELATION BETWEEN THE SERUM GASTRIN CONCENTRATIONS AND RATE OF GASTRIC SECRETION [Abstract]. (Eng.) Okabayashi, T.; Shimano, Y. (Nara Medical Univ., Nara, Japan). *Gastroenterol. Jpn.* 10(3):232-233; 1975.

8048 FASTING SERUM GASTRIN IN CHILDREN WITH DUODENAL ULCER COMPARED TO CONTROLS [Abstract]. (Eng.) Christie, D. L.; Ament, M. E. (UCLA Sch. Medicine, Los Angeles, CA 90024). *Pediatr. Res.* 10(4):352; 1976.

8049 HISTAMINE H_2 RECEPTOR: INVOLVEMENT IN GASTRIC ULCERATION. (Eng.) Brown, P. A.; Brown, T. H.; Vernikos-Danellis, J. (Ames Res. Center, NASA, Biomedical Res. Div., Moffett Field, CA 94035). *Life Sci.* 18(3):339-343; 1976.

8050 VAGAL HYPERACTIVITY IN DUODENAL ULCER: WITH AND WITHOUT EXCESSIVE ACID SECRETION. (Eng.) Lam, S. K.; Sircus, W. (Dept. Medicine, Univ.

ong Kong, Hong Kong). *Rend. Gastroenterol.* 7(1):
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051 VAGAL INNERVATION OF THE ANTRUM AND GASTRIC ACID SECRETION [Abstract].

(Eng.)
himazu, H.; Tani, M. (Faculty of Medicine, Univ.
okyo, Tokyo, Japan). *Gastroenterol Jpn.* 10(3):232;
975.

052 MORPHOLOGY OF THE GASTRIC MUCOSA IN PATIENTS WITH ULCER DISEASES.

(Eng.) Trier,
. S. (Peter Bent Brigham Hosp. and Harvard Medical
ch., Boston, MA 02115). *Am. J. Dig. Dis.* 21(2):
38-140; 1976.

8053 SOME COMMENTS ON THE CAUSE OF GASTRIC AND DUODENAL ULCERS.

(Eng.) Dragstedt, L. R. (Univ. Florida, Coll. Medicine, Gainesville, FL 32610). *Am. J. Dig. Dis.* 21(2):197-200; 1976.

8054 THE INCIDENCE OF GASTRIC ULCER IN COPENHAGEN COUNTY.

(Eng.) Bonnevie, O. (Gentofte Univ. Hosp., DK-2900 Hellerup, Denmark). *Scand. J. Gastroenterol.* 10(3):231-239; 1975.

See also, 7753, 7758, 7931, 7995, 7996, 7997, 8017, 8021, 8022, 8373.

SMALL INTESTINE

055 THE HISTOLOGICAL CLASSIFICATION OF DUODENITIS IN FIBREOPTIC BIOPSY SPECIMENS.

Eng.) Whitehead, R.; Roca, M.; Meikle, D. D.;
kinner, J.; Truelove, S. C. (Finders Medical Centre,
edford Park, SA 5042, Australia). *Digestion* 13(3):
29-136; 1975.

uring an investigation of upper gastrointestinal
iseases by fiberoptic endoscopy, 747 duodenal biopsy
pecimens were examined, and this material was used
o develop a classification system for nonspecific
uodenitis. The specimens were obtained from 396
ubjects, including healthy volunteers and patients
ith nonulcer dyspepsia, hiatus hernia, gastric ulcer,
uodenal ulcer, anemia and gastrointestinal bleeding
f unknown etiology, gastric neoplasms, pernicious
nemia, postgastrectomy, postgastroenterostomy, post-
agotomy and pyloroplasty, cholangitis, and self-
oisoning. The specimens were obtained from the
uodenal cap (348 specimens), proximal descending
uodenum (220), distal descending duodenum beyond
he ampulla (145), and horizontal duodenum (34). Mild
uodenitis was characterized by no significant alter-
tions in the general morphology; the superficial
pithelium was normal in height, but sometimes con-
ained an excess of lymphocytes. The main histolo-
ical feature was an excessive cellularity of the
amina propria, with or without lymphoid aggregates.
Moderate duodenitis was characterized by increased
ellularity of the lamina propria and abnormalities
f the superficial epithelium. The most severe grade
f duodenitis was characterized by the critical fea-
ture of erosion of the abnormal epithelium. This
as invariably associated with complete effacement
nd loss of the villous processes and the heaviest
egree of inflammatory cell infiltration. In nine
ormal control biopsies and nine cases from each of
the three grades of duodenitis, a quantitative estimation of the surface to volume ratio and the number of cells in the lamina propria was made. Between the groups, the differences in surface to volume ratio and in the cellularity of the lamina propria were statistically significant. This study shows that a simple subjective grading of duodenitis is possible, and quantitative methods confirm its accuracy.

8056 JEJUNOILEAL BYPASS: ROENTGENOGRAPHIC OBSERVATIONS.

(Eng.) Balthazar, E. J.; Goldfine, S. (New York Medical Coll., Flower-Fifth Ave. Hosps., 1249 Fifth Ave., New York, NY 10029). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1): 138-142; 1975.

The rationale and surgical procedures for intestinal bypass operations in the management of morbid obesity are outlined, and the roentgenographic appearance of the gastrointestinal tract postsurgery is discussed. End-to-side anastomoses of jejunum to colon represented the first approach in the early sixties, but these were associated with frequent complications, including death. End-to-side jejunoileal anastomosis from a point 14 inches from the ligament of Treitz to 4 inches above the ileocecal valve, coupled with closure of the proximal end of the bypassed intestine, have resulted in an average weight loss of 130 pounds that plateaus after 3 yr. A third procedure involves an end-to-end jejunoileal anastomosis from a point 12 inches distal to the ligament of Treitz to 12 inches proximal to the ileocecal valve. The proximal end of the bypassed intestine is closed, and the distal end is anastomosed to the transverse or sigmoid colon for draining purposes. Good results have been claimed, because of an ensuing gradual and steady weight loss. The reason for the weight loss to stop past the third year is enlargement of the small bowel and hypertrophy of the mucosal folds, with concomitant jejunization of the terminal ileum. In roentgenologic evaluations of the postoperative bowel, several features are looked for: a transit time from pylorus to cecum of 5-10 min, the approximate length of the functioning small bowel, the degree of dilatation and mucosal hypertrophy, the type of anastomosis, and the reflux into the bypassed ileum.

8057 FASTING AND STIMULATED SERUM GASTRIN LEVELS IN HUMANS FOLLOWING JEJUNO-ILEAL BYPASS.

(Eng.) Coyle, J. J.; Schwartz, M. Z.; Eisenberg, M. M.; Varco, R. L.; Buchwald, H. (Dept. Surgery, Univ. Minnesota Hosp., Box 290, Minneapolis, MN 55455). *J. Surg. Res.* 20(4):365-368; 1976.

Serum gastrin levels both in the fasting state and following a standard test meal were studied in nine patients who had undergone jejunoileal bypass for morbid obesity 1 yr previously and in nine normal controls. After an overnight fast, serum samples were drawn, and then all subjects ate a standard 16-g protein meal. Serum samples were again obtained at several intervals from 5 min to 2 hr after the start of the meal, and serum gastrin levels were determined by radioimmunoassay. There was no statistically significant difference (at the $p<0.05$ level) between controls and patients in fasting or peak-response levels of serum gastrin or in the integrated gastrin response to the meal. Because the significant increases in fasting and peak response levels of serum gastrin in humans following massive small bowel resection cannot be demonstrated in humans following massive small bowel bypass, it is concluded that the bypassed small intestine may retain a role in gastrin metabolism.

8058 LIVER DYSFUNCTION FOLLOWING SMALL-BOWEL BYPASS FOR OBESITY: NONOPERATIVE TREATMENT OF FATTY METAMORPHOSIS WITH PARENTERAL HYPERALIMENTATION.

(Eng.) Ames, F. C.; Copeland, E. M.; Leeb, D. C.; Moore, D. L.; Dudrick, S. J. (M.D. Anderson Hosp., Houston, TX). *JAMA* 235(12):1249-1252; 1976.

The clinical and metabolic course of an obese man in whom jaundice and fatty metamorphosis (steatosis) of the liver developed 5 months after jejunoileal bypass is described. The patient initially weighed 172.4 kg; at the time of the liver dysfunction, he weighed 121.6 kg. The patient became weak, anorectic, nauseated, and jaundiced. Abnormal laboratory values included a serum bilirubin level of 8.9 mg/100 ml; SGOT, 125 U/ml; and serum albumin, 1.5 g/100 ml. Percutaneous needle liver biopsy specimen demonstrated extreme fatty infiltration with bile stasis. Intravenous hyperalimentation therapy began with a continuous infusion of a 4.25% crystalline amino acid and 25% dextrose solution and continued after stabilization at 80 ml/hr (2,000 kcal/day). The patient was allowed a high-protein, low-carbohydrate diet. After 75 days of therapy, the laboratory values were SGOT, 25 U/ml; serum bilirubin, 2 mg/100 ml; albumin, 3.8 g/100 ml; and total serum proteins, 6.9 g/100 ml. Biopsy showed a decrease in fatty infiltration and bile stasis and an improvement in the appearance of hepatocytes, but early periportal fibrosis. The patient was discharged weighing 112.5 kg, toleratin a high-protein, low-carbohydrate diet, and receivin no medication other than therapeutic vitamins. A repeat biopsy several months later showed a further decrease in fatty infiltration but persistent periportal fibrosis. The steatosis and dysfunction wer probably caused by the preferential absorption of carbohydrate in the remaining small bowel, with resulting protein starvation. The results show that this treatment offers sufficiently balanced nutritio to support liver metabolism, regeneration, and fat mobilization with continued weight loss.

8059 THE CONTINENT ILEOSTOMY AND THE ISOLATED ILEAL BLADDER.

(Eng.) Madigan, M. R. (Bishop's Stortford Hosp., Herts, England). *Ann. R. Coll. Surg. Engl.* 58(1):62-69; 1976.

The details of the Kock procedure are summarized, an treatment results with 19 cases are briefly reported The technique is contraindicated in the presence of Crohn's disease, fulminating ulcerative colitis, or high dose steroid therapy. In nine cases, a conventional ileostomy was converted to a continent reservoir, and in 10 cases, total proctocolectomy and ileal reservoir was done as a primary procedure. Seventeen of the 19 eventually had satisfactory, competent reservoirs. Twelve had no complications. Among the complications, four had leaking valves, which were reoperated and were continent, and one had a leaking reservoir, which was sutured and normal. There was one operative death, probably due to distal ileal ischemia, and one patient had a leaking valve which was reoperated elsewhere. The complications common to any major surgical procedure or peculiar to ulcerative colitis were not increased in the presence of an ileal reservoir. It is concluded that this procedure is a safe one and that it has several advantages to the patient.

8060 INTESTINAL LYMPHANGIECTASIA: THE VARIABILITY OF PRESENTATION. A STUDY OF FIVE CASES.

(Eng.) Roberts, S. H.; Douglas, A. P. (Royal Victoria Infirmary, Newcastle upon Tyne, NE1 4LP England). *Q. J. Med.* 45(177):39-48; 1976.

Five cases of intestinal lymphangiectasia are described. All had variable protein loss from the gut, and in four, the diagnosis was first suggested by jejunal biopsy. A 22-yr-old woman presented with a history of anemia and a recent onset of peripheral edema. The protein loss from the bowel was 12% of an administered dose (normal<0.8%). A jejunal biopsy was normal, but lymphangiography revealed slow passage into the thoracic duct. The patient had an excellent response to a low-fat diet supplemented with medium chain triglycerides. The second patient, a 21-yr-old woman, developed vomiting, weight loss, and episodic diarrhea. Protein loss was 5.5%, and bowel radiography showed dilated lymphatics, which were confirmed on jejunal biopsy and lymphangiogram. She experienced full symptomatic recovery on treatment with diuretics and vitamins. Protein loss continued during remission. A 15-yr-old girl presented with nephrotic syndrome following a streptococcal infection. Corticosteroid therapy was not helpful, and she was treated with diuretics alone for 10 yr. During the next 4 yr, she was hospitalized several times for complaints related to her glomerulonephritis. At age 34, a jejunal biopsy revealed distended central lacteals in two villi, and protein loss into the bowel was 3.1%. She died 1 yr later from left ventricular failure and septicemia. At autopsy, there was no evidence of widespread lymphatic abnormalities. A 48-yr-old woman presented with malaise, diarrhea, and weight loss. At sigmoidoscopy, the mucosa was inflamed and friable. Some villi in the jejunal biopsy showed dilated lymphatic vessels. Protein loss from the gut was 1.7%. She had a good response to treatment with blood transfusions, low-fat diet, medium chain triglycerides, and oral iron and vitamin supplements. A 3-yr-old boy developed diarrhea, and at age 8, steatorrhea was demonstrated and a diagnosis of cystic fibrosis was made. Jejunal biopsy showed dilated lymphatics, and protein loss from the bowel was 2%. On treatment with antibiotics, low-fat diet, and medium chain triglycerides, he gained weight and the diarrhea ceased. The conditions of four of these five patients symptomatically improved simply by the recognition and nonspecific treatment of intestinal lymphangiectasia. The results suggest the possibility that this condition may exist in a mild form in patients with protein-losing enteropathy.

8061 INTESTINAL AND PERITONEAL TUBERCULOSIS: REPORT OF TWO CASES. (Eng.) Fraki, O.; Peltokallio, P. (Second Dept. Surgery, Univ. Helsinki, Haartmanink 4, 00290, Helsinki 29, Finland). *Dis. Colon Rectum* 18(8):685-693; 1975.

The incidence, treatment, and clinical findings of 107 cases of abdominal tuberculosis are reviewed, and the case reports of two patients with intestinal tuberculosis are presented. In the entire series, there were 36 cases of intestinal tuberculosis, 15 occurring in the ileocecal region, 5 in the cecum, 13 in the small intestine, and 2 in the rectum; in the remaining case, a tuberculosis ulcer occurred in the duodenum. The symptoms included abdominal pain, weight loss, vomiting, diarrhea, constipation, and fever. A palpable tumor occurred in 87% of the cases. X-ray studies revealed small intestinal strictures in many cases. Resection was the most important form of therapy. Right hemicolectomy was performed in 85% of the patients with ileocecal or cecal tuberculosis. Histological examination of the bowel wall in all cases showed typical tubercles with epithelioid cells, giant Langerhans cells, a peripheral zone of inflammatory cells, and central caseation. Three patients died postoperatively, and three others died 1-3 yr postoperatively of recurrent abdominal tuberculosis. The case of a 54-yr-old woman with hemorrhage from a jejunal ulcer is presented. The patient recovered after emergency surgery and treatment with streptomycin, isoniazid, and rifampin. A second patient, a 64-yr-old woman, presented with recurrent bowel obstruction 12 and 23 yr after a side-to-side anastomosis. The anastomosis was resected and another one constructed. Histologic examination of the jejunal biopsy showed tuberculous granulomas in the mucosa, submucosa, muscle layer, and serosa. The patient recovered after antituberculosis therapy. Sixty-one patients had peritoneal tuberculosis. The most frequent symptom was abdominal pain, and a palpable tumor occurred in 25% of the cases. At surgery in 51 patients, peritoneal tubercles occurred in 38, ascites in 34, adhesions in 29, and small bowel obstruction in 5. The operative mortality was 7.8%. Ten patients had tuberculosis in other abdominal sites, including the mesenteric and retroperitoneal lymph nodes (7 cases), spleen (1), and liver (2). Good results are obtained with chemotherapy for both intestinal and peritoneal tuberculosis. The complications (e.g., obstruction) should be surgically treated; resection is the surgical procedure of choice.

8062 INJURIES TO DUODENUM, SMALL INTESTINE AND MESENTERY. (Eng.) Christensen, N. (San Francisco General Hosp., San Fransisco, CA 94110). *West. J. Med.* 123(6):499-502; 1975.

8063 SMALL-BOWEL VOLVULUS WITH APLASTIC ANEMIA. (Eng.) Petreshock, E. P.; Pessah, M. L. (Long Island Jewish-Hillside Medical Center, Long Island, NY). *N.Y. State J. Med.* 76(2):294-296; 1976.

8064 PREVENTION AND SUPPRESSION BY AZATHIOPRINE OF VENOM-INDUCED PROTEIN-LOSING GASTROPATHY IN DOGS. (Eng.) Davenport, H. W. (Dept. Physiology, Univ. Michigan, Ann Arbor, MI 48109). *Proc. Natl. Acad. Sci. USA* 73(3):968-970; 1976.

8065 PREFORATION OF SMALL BOWEL DUE TO SLOW RELEASE POTASSIUM CHLORIDE (SLOW-K). (Eng.) Farquharson-Roberts, M. A.; Giddings, A. E. B.; Nunn, A. J. (Royal Devon and Exeter Hosp., [Wonford], Exeter EX2 5DW, England). *Br. Med. J.* 3(5977):206; 1975.

8066 RECURRENT OBSTRUCTION OF BYPASSED INTESTINE IN OBESITY SURGERY: A CHALLENGING LATE COMPLICATION. (Eng.) Rogers, N.; Carter, P.; Syphax, B. (Howard Univ. Coll. Medicine, Washington, DC). *J. Natl. Med. Assoc.* 68(1):28-30; 1976.

8067 RENAL FAILURE AFTER SMALL INTESTINAL BYPASS FOR OBESITY. (Eng.) Cryer, P. E.; Garber, A. J.; Hoffsten, P.; Lucas, B.; Wise, L. (Washington Univ. Sch. Medicine, St. Louis, MO). *Arch. Intern. Med.* 135(12):1610-1612; 1975.

8068 INTESTINAL BYPASS IN MORBID OBESITY: LONG-TERM METABOLIC SEQUELAE. (Eng.) Kish, G. F.; Parker, F. W.; Joseph, W. L. (George

Washington Univ. Medical Center, Washington, DC). *Am. Surg.* 41(12):786-792; 1975.

8069 BODY COMPOSITION IN MORBIDLY OBESE PATIENTS BEFORE AND AFTER JEJUNOILEAL BYPASS. (Eng.) Scott, H. W., Jr.; Brill, A. B.; Price, R. R. (Vanderbilt Univ. Medical Center, Nashville, TN 37232). *Ann. Surg.* 182(4):395-404; 1975.

8070 ALTERATIONS IN SMALL-BOWEL MICROFLORA IN ACUTE INTESTINAL OBSTRUCTION. (Eng.) Sykes, P. A.; Boulter, K. H.; Schofield, P. F. (Univ. Hosp. South Manchester, Manchester M20 8LR, England). *J. Med. Microbiol.* 9(1):13-22; 1976.

8071 ELECTRON MICROSCOPE STUDIES ON THE MORPHOLOGICAL CHANGES OF THE SMALL INTESTINAL MUCOSA IN THREE INFANTS WITH COW'S MILK INTOLERANCE [Abstract]. (Eng.) Rossipal, E.; Aubock, L. (No affiliation given). *Acta Paediatr. Scand.* 63(Suppl. 4):654; 1974.

8072 DISACCHARIDASE ACTIVITIES IN INTESTINAL METAPLASIA [Abstract]. (Eng.) Gudmand-Hoyer, E.; Asp, N. G.; Mollmann, K. M. (Gentofte Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 10(34):46; 1975.

8073 MECKEL'S STONES: A CASE REPORT. (Eng.) Hirschy, J. C.: Thorpe, J. J.; Cortese, A. F. (New York Hosp.-Cornell Medical Center, New York, NY). *Radiology* 119(1):19-20; 1976.

8074 INTESTINAL MALROTATION IN ADULTS: ROENTGENOGRAPHIC ASSESSMENT WITH EMPHASIS ON ISOLATED COMPLETE AND PARTIAL NONROTATIONS. (Eng.) Balthazar, E. J. (New York Medical Coll., Metropolitan Hosp. Center, 1901 First Ave., New York, NY 10019). *Am. J. Roentgenol.* 126(2):358-367; 1976.

8075 INTUSSUSCEPTION AND NUTRITIONAL STATUS [Letter to Editor]. (Eng.) Janik, J. S.; Firor, H. V. (Cook County Hosp., 1825 W. Harrison St., Chicago, IL 60612). *J. Pediatr.* 88(2):358; 1976.

8076 NONOPERATIVE TREATMENT OF MECONIUM ILEUS EQUIVALENT. (Eng.) Perman, J.; Breslow, L.; Ingall, D. (Evanston Hosp., 2650 Ridge Ave., Chicago, IL 60201). *Am. J. Dis. Child.* 129(10): 1210-1211; 1975.

8077 ENDOSCOPIC REMOVAL OF BLEEDING BRUNNER GLAND ADENOMA. (Eng.) Appel, M. F.; Bentlif, P. S. (Kelsey-Seybold Clinic, 624 Fannin St., Houston, TX 77025). *Arch. Surg.* 111(3):301; 1976.

8078 NON-HODGKIN'S LYMPHOMA PRESENTING WITH OSSEOUS LESIONS. (Eng.) Ngan, H.; Preston, B. J. (Nottingham General Hosp., Nottingham, NG1 6HA England). *Clin. Radiol.* 26(3):351-356; 1975.

8079 THE INTRA-UTERINE DEMONSTRATION OF DUODENAL ATRESIA BY ULTRASOUND. (Eng.) Loveday, B. J.; Barr, J. A.; Aitken, J. (Cambridge Military Hosp., Aldershot, Hampshire, England). *Br. J. Radiol.* 48(576):1031-1032; 1975.

8080 CONGENITAL ATRESIA OF THE DUODENUM WITH GASTRIC PERFORATION: CASE REPORT AND REVIEW OF THE LITERATURE. (Eng.) Takebayashi, J.; Asada, K.; Tokura, K.; Ohokita, A.; Okuno, M.; Satake, K. (Osaka City Univ. Medical Sch., 5-7, Asahimachi 1 chome, Abeno-ku, Osaka, 545, Japan). *Am. J. Dis. Child.* 129(10):1227-1228; 1975.

8081 DUODENOJEJUNAL ATRESIA WITH "APPLE-PEEL" SMALL BOWEL: A DISTINCT FORM OF INTESTINAL ATRESIA. (Eng.) Leonidas, J. C.; Amoury, R. A.; Ashcraft, K. W.; Fellows, R. A. (Children's Mercy Hosp., 24th St. and Gillham Road, Kansas City, MO 64108). *Radiology* 118(3):661-665; 1976.

8082 ZINC AND DIODOQUIN IN ACRODERMATITIS ENTEROPATHICA [Letter to Editor]. (Eng.) Delves, H. T.; Harries, J. T.; Lawson, M. S.; Mitchell, J. D. (Hosp. Sick Children, Great Ormond St., London WC1N 3JH, England). *Lancet* 2(7941):929; 1975.

8083 ROLE OF ORAL NUTRITION ON INTESTINAL ADAPTATION AFTER RESECTION [Abstract]. (Eng.) Morin, C. L.; Ling, V. (Hopital Sainte-Justine, Universite de Montreal, Montreal, Canada). *Pediatr. Res.* 10(4);357; 1976.

8084 MASSIVE SMALL BOWEL IN A NEONATE: FOUR-YEAR FOLLOW-UP. (Eng.) Aaronson, I. A.; Bowie, M. D.; Cywes, S.; Louw, J. H. (Red Cross War Memorial Children's Hosp., Rondebosch 7700, Cape Town, S. Africa). *Arch. Surg.* 110(12):1485-1490; 1975.

8085 A COMPLICATION OF PROLONGED INTESTINAL INTUBATION: GASEOUS DISTENSION OF THE TERMINAL BALLOON. (Eng.) Rozanski, J.; Kleinfeld, M. (Jackson Memorial Hosp., Univ. Miami Sch. Medicine, Miami, FL). *Am. J. Dig. Dis.* 20(11):1067-1070; 1975.

8086 SMALL INTESTINAL MOTILITY: CLINICAL RECORDING OF ELECTRICAL SPIKE POTENTIALS AND INTRALUMINAL PRESSURE VARIATIONS. (Eng.) Oigaard, A. (Rigshospitalet, Univ. Copenhagen, Copenhagen, Denmark). *Dan. Med. Bull.* 23(1):5-12; 1976.

See also, 7698, 7863, 7864, 7876, 7877, 7931, 7932, 7934, 7947, 7948, 7952, 7989, 7996, 8003, 8010, 8021, 8094, 8095, 8138, 8141, 8225, 8358, 8359, 8366, 8372, 8377, 8378, 8379, 8380, 8381, 8383, 8391, 8392, 8393, 8396, 8397, 8405, 8411, 8421.

Malabsorption

8087 ABNORMAL MICELLE FORMATION IN VARIOUS MALABSORPTION SYNDROMES. (Eng.) Ishikawa, M.; Masamune, O.; Yamada, H.; Takahashi, T.; Matsuura, S.; Torihata, K.; Gonai, T.; Nagasaki, A.; Tsuboi, M.; Yamagata, S. (Yamagata Univ. Sch. Med., Yamagata, Japan). *Tohoku J. Exp. Med.* 118(Suppl.): 89-95; 1976.

To clarify the relation between micelle-forming factors and the degree of micelle formation, the upper intestinal contents of 12 normal subjects and 18 patients with steatorrhea (6 cases of chronic pancreatitis, 4 of pancreatectomy, 4 of ileal disease, and 4 of blind-loop syndrome) were analyzed after a Borgstrom test meal. In normal subjects, the mean proportion of total fat in the micellar phase was 79.9%, the mean concentration of conjugated bile salts was 7.7 mM, and the ratio of glycine conjugates to taurine conjugates was 2.3. There were no unconjugated bile salts in normal individuals, and the mean lipase concentration, polyethyleneglycol (PEG) concentration, and pH were 198 U, 32.2, and 6.7, resp. The ratio of free fatty acids and monoglyceride to total fat was 73.4%. In chronic pancreatitis and pancreatectomy, 58 ± 21.4% and 23 ± 19.2% of the total fat were hydrolyzed to fatty acid and monoglyceride, resp. The proportion of fat in the micellar phase was 56%, and the lipase concentration was 78 U in chronic pancreatitis; corresponding values in pancreatectomy were 24.9% and 33.9%. Bile salts and pH were normal. In ileal diseases, 41.9% of the fat was in the micellar phase, and the concentration of conjugated bile salts was 1.8 mM. In blind-loop syndrome, the ratio of fat contents in the micellar phase to total fat was relatively low, and the lipase concentration was similarly reduced (93.5 U). The concentration of total bile salts was 16.5 mM/l; unconjugated bile salts were detected by thin layer chromatography. The results demonstrate that the mixing of the test meal with pancreatic juice, bile, and the proper intestinal juice is well-coordinated in normal subjects.

8088 IMMUNOLOGICAL PHENOMENA IN THE JEJUNUM AND SERUM AFTER REINTRODUCTION OF DIETARY GLUTEN IN CHILDREN WITH TREATED COELIAC DISEASE. (Eng.) Lancaster-Smith, M.; Packer, S.; Kumar, P. J.; Harries, J. T. (Hosp. Sick Children, Great Ormond St., London WC1, England). *J. Clin. Pathol.* 29(7):592-597; 1976.

Immunological changes in the jejunal mucosa and serum were studied in 22 treated celiac children in whom the diagnosis had been made without biopsy between 6 months and 5 yr and who at the time of study were 5-16.5 yr old. Sixteen children had been on a gluten-free diet from 1.5 to 13 yr, and six admitted to consuming varying amounts of gluten immediately before the study. Fifteen had proven celiac disease based on the jejunal response to gluten (10 g/day as wheat protein for 3 months), and the remaining seven had a normal mucosa and no clinical or biochemical evidence of celiac disease, even after a substantial gluten intake from 1 to 12 yr. The numbers of jejunal mucosal immunoglobin A (IgA) and IgG-containing cells in celiac patients on gluten-free diets did not differ from controls. The numbers of these cells in patients on gluten-containing diets were significantly greater than controls ($p<0.05$ for IgA cells and $p<0.002$ for IgG cells). In 10 patients studied serially, there was a significant increase in the numbers of these cells after 3 months on a gluten-containing diet ($p<0.01$ for IgA cells and $p<0.05$ for IgG cells). Greater numbers of these cells were also seen in biopsies with villous atrophy than in celiac biopsies with normal morphology ($p<0.01$ for IgA and $p<0.05$ for IgG). The numbers of IgM cells were greater than in controls, even in celiacs on a gluten-free diet ($p<0.01$), and this number increased in patients on gluten-containing diets ($p<0.002$ compared to controls). There was an increase in IgM cells in the 10 patients studied serially during 3 months on a gluten-containing diet. In three serially studied subjects who had normal jejunal morphology after 3 months on a gluten-containing diet, there was no significant change in any of the three cell types. Basement membrane staining with anti-IgA serum occurred in celiacs and was most intense in untreated patients. Serum concentrations of IgA, IgG, and IgM in celiac patients did not differ from controls, regardless of diet. After 3 months on a gluten-containing diet, there was no significant change in serum IgA and IgG, but the level of IgM fell significantly ($p<0.01$). It is suggested that both IgA and IgM systems are important in the immunopathogenesis of the small intestinal lesion of childhood celiac disease.

8089 REGRESSIVE MYOPATHY WITH MYASTHENIC SYNDROME IN IDIOPATHIC GLUTEN ENTEROPATHY. (Ger.) Gundlach, H.-J.; Ernst, K. (Universitats-Nervenklinik Rostock, DDR-25 Rostock-Gehlsdorf, Gehlsheimer Strasse 20, E. Germany). *Psychiatr. Neurol. Med. Psychol. (Leipz.)* 27(4):225-230; 1975.

The case history of frank myopathy in a patient with protracted idiopathic sprue is presented. A 30-yr-old woman with an unexceptional family history presented with marked, persistent diarrhea following parturition. Endiaron brought transient relief. Asthenia in the extremities and locomotor difficulties began within 3 yr. Glycine, vitamin B complex, and pepsacid, administered under suspicion of sprue, elicited transient relief. Progressive muscle dystrophy was established 12 months later, with intractable asthenia. A diagnosis of gluten enteropathy followed histological confirmation of villous atrophy in the small bowel, depressed serum potassium and calcium levels, and steatorrhea. General amelioration was established by electrolyte, iron, and vitamin substitution therapy. The proximal myasthenia, whose histological picture included only fiber swelling but no destructive changes or interstitial proliferation, regressed under management of the enteropathy.

8090 CHARACTERIZATION OF α_1-ANTITRYPSIN IN THE INCLUSION BODIES FROM THE LIVER IN α_1-ANTITRYPSIN DEFICIENCY [Abstract]. (Eng.) Eriksson, S.; Jeppsson, J.-O.; Larsson, C. (Dept. Internal Medicine, Univ. Lund, Lund, Sweden). *Digestion* 12(4/6):301-302; 1975.

8091 THE INCIDENCE OF COELIAC DISEASE AND HL-A8 IN DERMATITIS HERPETIFORMIS [Abstract]. (Eng.) Scott, B. B.; Young, S.; Rajah, S. M.; Marks, J.; Losowsky, M. S. (St. James' Hosp., Leeds, England). *Gut* 16(10):845; 1975.

8092 CELIAC SPRUE--REPORT OF AN ATYPICAL CASE. (Eng.) Speicher, M. R.; McCormick, J. V. (No affiliation given). *Bull. Geisinger Med. Cent.* 28(1):5-7; 1976.

8093 IMPAIRED RELEASE OF SECRETIN IN CELIAC SPRUE [Abstract]. (Eng.) Rhodes, R. A.; Chey, W. Y.; Tai, H. H.; Escoffery, R. (Genesee Hosp., Rochester, NY). *Clin. Res.* 23(5):578A; 1975.

8094 IDIOPATHIC ENTEROPATHY: AN EVALUATION IN RURAL IRAN WITH AN APPRAISAL OF NUTRIENT LOSS. (Eng.) Nasr, K.; Haghighi, P.; Abadi, P.; Lahimgarzadeh, A.; Hedayati, H.; Halstead, J. A.; Reinhold, J. D. (Nemazee Hosp., Shiraz, Iran). *Am. J. Clin. Nutr.* 29(2):169-176; 1976.

8095 DUODENAL REGULATION OF A FLUID TEST MEAL IN MALABSORPTIVE STATES (SUCH AS GLUTEN ENTEROPATHY, CHRONIC PANCREATITIS, SHORT BOWEL SYNDROME AND SHUNT OPERATED OBESE PATIENTS). (Eng.) Moberg, S. (St. Goran's Hosp., Stockholm, Sweden). *Scand. J. Gastroenterol.* 10(Suppl 35):27-29; 1975.

8096 LACTOSE MALABSORPTION IN MEXICAN AMERICANS [Abstract]. (Eng.) Woteki, C. E.; Weser, E.; Young, E. A. (Dept. Medicine, Univ. Texas Health Science Center, San Antonio, TX). *Clin. Res.* 24(1):15A; 1976.

8097 STUDIES ON THE ETIOLOGY OF MILK INTOLERANCE IN JAPANESE ADULTS. (Eng.) Yoshida, Y.; Sasaki, G.; Goto, S.; Yanagiya, S.; Takashina, K. (Hirosaki Univ. Sch. Medicine, Zaifu-cho, 5, Hirosaki City, 036 Japan). *Gastroenterol. Jpn.* 10(1):29-34; 1975.

8098 THE BOUND CARBOHYDRATES OF FRACTIONATED SERUM PROTEINS IN PROTEIN-CALORIE MALNUTRITION. (Eng.) Maghrabi, R. H.; Waslien, C. I. (U.S. Naval Medical Res. Unit No.3, c/o Spanish Embassy, Cairo, Egypt). *Am. J. Clin. Nutr.* 29(2):146-150; 1976.

8099 CLINICALLY APPARENT VITAMIN B_{12} DEFICIENCY IN CHRONIC PANCREATIC INSUFFICIENCY [Abstract]. (Eng.) Toskes, P. (Gainesville Veterans Admin. Hosp., Gainesville, FL). *Clin. Res.* 24(1):14A; 1976.

8100 CLINICAL AND MORPHOLOGICAL FEATURES DURING THE COURSE OF WHIPPLE'S DISEASE. (Ger.) Atefie, K.; Gangl, A.; Grabner, G.; Stockinger, L. (II. Medizinische Universitatsklinik, Garnisongasse 13, A-1090 Vienna, Austria). *Leber Magen Darm* 5(6):256-264; 1975.

8101 ULTRASTRUCTURE OF CARDIAC LESION IN WHIPPLE'S DISEASE [Abstract]. (Eng.) Davis, J. S.; Lie, J. T. (Baylor Coll. Medicine, Houston, TX 77025). *Am. J. Clin. Pathol.* 65(2):272; 1976.

See also, 7714, 7949, 8060, 8068, 8317, 8344, 8371, 8372.

LARGE INTESTINE

8102 CLINICAL PRESENTATION OF DISEASES OF THE LARGE BOWEL: A DETAILED STUDY OF 642 PATIENTS. (Eng.) Staniland, J. R.; Ditchburn, J.; de Dombal, F. T. (General Infirmary, Leeds LS1 3EX, England). *Gastroenterology* 70(1):22-28; 1976.

The symptoms and clinical findings in 642 patients with a variety of lower gastrointestinal disorders, including rectosigmoid cancer (131 patients), diverticular disease (265), right-sided colonic cancer (50), ileocecal Crohn's disease (61), colonic Crohn's disease (50), and ulcerative colitis (85) were reviewed. Ninety percent of the patients with diverticular disease complained of pain at the time of hospitalization; the same was true of 87% of the patients with ileocecal Crohn's disease, 80% of those with carcinoma of the cecum or ascending colon, 55% of those with ulcerative colitis, 58% of those with colonic Crohn's disease, and 34% of those with rectosigmoid cancer. Half of the patients with ileocecal Crohn's disease complained of pain in the right half or center of the abdomen, while 28% of the patients with right-sided colonic cancer (usually cecal) complained of pain in the right lower quadrant, and

28% of patients with diverticular disease complained of left lower quadrant pain. Patients with colitis or rectosigmoid cancer usually had intermittent pain related to defecation, whereas the patients with diverticular disease, ileocecal Crohn's disease, and right-sided colonic cancer had steady or colicky pain. Almost half of the patients with lower gastrointestinal disease complained of symptoms referable to the upper gastrointestinal tract: 73% of the patients with diverticular disease, 30% of those with ileocecal Crohn's disease and right-sided colonic cancer, and over 20% of those with colitis had nausea; nearly 50% of the patients with active diverticular disease had vomiting; and approximately half of all the patients had anorexia. Over half of the patients with right-sided cancer and over three-fourths of the patients with ileocecal Crohn's disease had a normal and unaltered bowel frequency. Twenty-three patients with diverticular disease, 14% of those with ileocecal Crohn's disease, and 12% of patients with right-sided colonic cancer had increased urinary frequency. Approximately 40% of the patients with large bowel cancer had undergone previous, unrelated abdominal surgery. At the physical examination, the presence of abdominal tenderness or a palpable abdominal mass was helpful in a discriminate diagnostic sense. An analysis of the results of sigmoidoscopy and rectal examination revealed that, although the classical changes of Crohn's disease may eventually develop, they may not develop early in the course of the illness and are of limited diagnostic value. It is suggested that the data obtained in the present study may be beneficial in the diagnosis of large bowel diseases.

8103 FURTHER STUDIES ON LIPID-CHEMICAL DIFFERENCES BETWEEN CANCEROUS AND ADENOMATOUS POLYPOUS TISSUES IN THE HUMAN LARGE INTESTINE. (Eng.) Nakazawa, I.; Yamagata, S.; Watanabe, H. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 118(Suppl.):117-125; 1976.

The tissues from 17 patients with colonic cancer were compared biochemically with those from 18 patients with adenomatous polyps of the colon. The total lipids in both tissues from the cancerous and benign lesions and from the normal tissue surrounding the lesions were separated into triglycerides and phospholipids by thin-layer chromatography. The fatty acid content of the total lipids, determined by gas-liquid chromatography, was decreased in 71% of the tissues from cancerous lesions, in comparison with the fatty acid content in the normal tissue surrounding the lesions. The fatty acid content was increased in 80% of the adenomatous polyp tissues. The fatty acid content of phospholipid was decreased in 60% of the cancerous tissues, but was increased in 71% of the adenomatous polyp tissues, compared with the control tissues. The fatty acid content of triglyceride in the cancerous lesions was decreased in all cases and in 93% of the adenomatous polyp tissues. This may be due to increased utilization of triglyceride in rapidly proliferating cancerous tissues or to a depressed biosynthesis of triglyceride in cancerous tissues. The ratios of the phospholipid fatty acid content to the triglyceride fatty acid content in the neoplastic tissues were always higher than those of the control tissue in both benign and cancerous tissues. The mean deviation rate (DR, the percentage of fatty acid in the morbid tissue/percentage of fatty acid in the control tissue) for $C_{14:0}$ in the cancerous tissues (2.307) was significantly increased in comparison with that in the benign tissues (1.001). The DR value of $C_{20:4}$ in the cancerous tissue (0.762) was decreased in comparison with that in the benign tissues (1.003). The ratio of the DR value of $C_{14:0}$ to $C_{20:4}$ ranged from 2.064 to 4.125 for 10 cancerous tissues and from 0.393 to 1.856 for 16 benign tissues. This ratio may be used to distinquish cancer and adenomatous polyps in the large intestine.

8104 FALSE-NEGATIVE STOOL OCCULT BLOOD TESTS CAUSED BY INGESTION OF ASCORBIC ACID (VITAMIN C). (Eng.) Jaffe, R. M.; Kasten, B.; Young, D. S.; MacLowry, J. D. (Clinical Center, Natl. Inst. Health, Bethesda, MD). *Ann. Intern. Med.* 83(6):824-826; 1975.

8105 COMPLICATIONS OF FLEXIBLE FIBEROPTIC COLONOSCOPY AND POLYPECTOMY. (Eng.) Rogers, B. H. G.; Silvis, S. E.; Nebel, O. T.; Sugawa, C.; Mandelstam, P. (Suite 406, 505 N. Lake Shore Drive, Chicago, IL 60611). *Gastrointest. Endosc.* 22(2): 73-77; 1975.

8106 ROUTINE PROCTOSIGMOIDOSCOPY: HOW OFTEN? (Eng.) Drexler, J. (Southern California Permanente Medical Group, 3425 West Manchester Boulevard, Inglewood, CA 90305). *Oncology* 30(4):324-327; 1974.

8107 ONE HUNDRED CONSECUTIVE CASES OF COLON RESECTION WITH SINGLE-LAYER SUTURE AND RADIOLOGICAL FOLLOW-UP. (Ger.) Hell, K.; Rossetti, M.; Allgower, M. (Chirurgische Klinik, Kantonsspital, CH-4410 Liestal, Switzerland). *Helv. Chir. Acta* 43(1/2):225-232; 1976.

8108 INFLUENCE OF XANTHINOL NICOTINATE AND HYPEROSMOLAR SOLUTION ON THE COLONIC MOTILITY. (Ger.) Willmen, H. R.; Kogel, H. (Abteilung Chirurgie, Med. Fakultat der RWTH Aachen, Goethestrasse 27/29, 5100 Aachen, W. Germany). *Int. J. Clin. Pharm. Biopharm.* 13(2):133-138; 1976.

8109 DIETARY FIBERS IN NUTRITION. (Ger.) Matzkies, F. (Med. Univ.-Klinik, Krankenhausstrasse 12, 852 Erlangen, W. Germany). *Fortschr. Med.* 94(1):11-14; 1976.

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8111 THE ROLE OF COLON ANAEROBES IN THE METABOLISM OF BILE ACIDS AND STERIODS, AND ITS RELATION TO COLON CANCER. (Eng.) Hill, M. J. (Bacterial Metabolism Res. Lab., Central Public Health Laboratory, Colindale Ave., London NW9 5DX, U.K.). *Cancer* 36(6):2387-2400; 1975.

8112 BIOLOGY OF LARGE BOWEL CANCER: PRESENT STATUS AND RESEARCH FRONTIERS. (Eng.) Lipkin, M. (Memorial Sloan-Kettering Cancer Center, 425 East 68th St., New York, NY 10021). *Cancer* 36 (6):2319-2324; 1975.

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8114 THE EPIDEMIOLOGY OF LARGE BOWEL CANCER. (Eng.) Wynder, E. L. (Naylor Dana Inst. Disease Prevention, American Health Foundation, New York, NY 10019). *Cancer Res.* 35(11):3388-3394; 1975.

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8121 TUMOR INDUCTION RELATIONSHIPS IN DEVELOPMENT OF TRANSPLANTABLE CANCERS OF THE COLON IN MICE FOR CHEMOTHERAPY ASSAYS, WITH A NOTE ON CARCINOGEN STRUCTURE. (Eng.) Corbett, T. H.; Griswold, D. P., Jr.,; Roberts, B. J.; Peckham, J. C.; Shabel, F. M., Jr. (Kettering-Meyer Lab., Southern Res. Inst., Birmingham, AL 35205). *Cancer Res.* 35 (9):2434-2439; 1975.

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8131 COLONIC ENDOMETRIOSIS: ROENTGEN STUDIES WITH A FIVE-YEAR FOLLOW-UP. (Eng.) Zimmer, G.; Kurzban, J. D.; Maklansky, D.; Marshak, R. H. (New York Hosp., Cornell Medical Center, 525 East 68th St., New York, NY 10021). *Am. J. Gastroenterol.* 64(5):410-413; 1975.

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8134 CRYOSURGERY FOR HEMORRHOIDS. (Eng.) Wegryn, S. P. (Louis S. Wegryn, M. D. Memorial Clinic, Sanibel-Captiva Rd., Sanibel Island, FL). *J. Med. Soc. N.J.* 72(12):1019-1020; 1975.

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See also, 7733, 7874, 7877, 7924, 7927, 7944, 7945, 7956, 7950, 7951, 7986, 8010, 8021, 8030, 8059, 8061, 8074, 8085, 8377, 8378, 8379, 8380, 8381, 8383, 8387, 8391, 8392, 8393, 8396, 8401, 8405, 8412, 8416, 8417, 8420.

LARGE INTESTINE

Ulcerative Colitis

8148 STUDIES IN ULCERATIVE COLITIS PATIENTS BY MMPI SAARBRUCKEN. (Ger.) Liedtke, R.; Tschirch, L.; Zepf, S. (II. Medizinische Klinik der Universitat, Metzstrasse 53/57, D-2300 Kiel, W. Germany). *Med. Klin.* 71(19):807-813; 1976.

Personality traits in ulcerative colitis patients are contrasted with traits in normal subjects by the Minnesota Multiphasic Personality Inventory (MMPI) test. The clinical sample included 18 men and 12 women, the majority of whom were 31-45 yr of age. Two-thirds of the colitis patients were 21-35 yr of age, and had been ill at least 10 yr. A control group exactly matched the colitis group in number, sex, age, family status, education, occupational status, and income. The rough values of the control group and the colitis group were compared without K-correction for the 14 standard scales of the MMPI. All group differences were insignificant ($p>0.05$) except four. The scale for hypochondria, introversion, and paranoia were $p<0.05$, and depression was $p<0.01$. To test whether these behavioral variables might be reactions to, rather than stimuli of, ulcerative colitis, the sample was divided into three groups of different durations of the colitis and the variables were compared. There was no correlation between the variables and the duration of illness.

8149 ULCERATIVE COLITIS IN THE JEWISH POPULATION OF TEL-AVIV YAFO III. CLINICAL COURSE. (Eng.) Gilat, T.; Lilos, P.; Zemishlany, Z.; Ribak, J.; Benaroya, Y. (Ichilov Hosp., Tel-Aviv, Israel). *Gastroenterology* 70(1):14-19; 1976.

The clinical course of ulcerative colitis was studied in 504 Jewish patients from the Tel-Aviv area, and further information on the geographical and ethnic variations of the disease was obtained. Forty-nine percent of the patients were Ashkenazi Jews. The following symptoms were initially recorded: blood in the stools, 6.2%; diarrhea, 13.9%; or both, 75.4%. Sigmoidoscopy showed bleeding in 370 cases, ulcers in 235, and mucosal changes (inflammation, edema, and granularity) in 440. At the initial examination, about half of the known cases had distal disease, and about one-tenth had universal disease. At the final examination, slightly over 25% had distal disease, and slightly less than 25% had universal disease. The incidence of colonic carcinoma in these patients was low (0.6%). Toxic megacolon occurred in 2.4% and perforation in 1.4%. Pseudopolyps occurred in 13.9% (5% in distal disease, 16.8% in substantial disease, and 40.6% in universal disease). Iron deficiency was documented in 28.8% of the cases, and anemia was found in 40.7%. The extracolonic manifestations included: skin disease, 2.6%; eye disease, 0.6%; liver disease, 3.2%; and arthritis, 4.8%. The incidence of liver disease correlated with the increased extent of the disease. Duodenal ulcer occurred in 7.1% of the cases, asthma in 2.2%, psychosis in 4.0%, and urinary calculi in 3.2%. Severe attacks occurred at one time or another during the course of the disease in 21.6% of the cases; the disease course was estimated to be mild in 63.3%, moderate in 22.4%, and severe in 14.1%. The results suggest that the disease process is progressive or stationary; there is hardly ever regression. The data are compared with other published series of ulcerative colitis occurring in patients in different geographical areas.

8150 IMMUNOGLOBULIN-CONTAINING CELLS IN THE INTESTINAL MUCOSA IN ULCERATIVE COLITIS. (Eng.) Tsuchiya, M.; Asakura, H.; Shimabukuro, K.; Morita, A.; Hibi, T.; Saito, H. (Dept. Internal Medicine, Sch. Medicine, Keio Univ., 35 Shinanomachi, Shinjuku-ku, Tokyo, Japan). *Gastroenterol. Jpn.* 9(4):385-394; 1975.

The distribution of immunoglobulin (Ig)-containing cells in the colonic mucosa of seven thymectomized patients with ulcerative colitis is described. All patients underwent roentgenological examination of the colon following barium enema, endoscopic examination, serum Ig assay, and biopsy to determine the distribution of Ig-containing cells in the colonic mucosa. All cases showed a distribution pattern of IgG- and IgM-containing cells that was similar to that of normal controls. There was an increased number of IgA-containing cells in 2/7, but no significant change in intramucosal distribution. There was no significant correlation between the number of IgG-, IgA-, or IgM-containing cells and stage of disease, area of involvement, or degree of severity. Also, no significant relation could be found among the distribution of Ig-containing cells in the mucosa and the roentgenologic or endoscopic findings of the colon, or serum Ig levels. Thus, the study failed to reveal a definite change or pattern in serum and tissue Ig, the principal constituents of humoral immunity, that could be associated with ulcerative colitis.

8151 EPITHELIAL DYSPLASIA IN ULCERATIVE COLITIS. HISTOLOGICAL POSSIBILITY FOR THE EARLY DIAGNOSIS OF "COLITIS" CARCINOMA. (Ger.) Otto, H. F.; Gebbers, J.-O. (Pathologisches Institut der Universitat Hamburg, Martinistrasse 52, D-2000 Hamburg, W. Germany). *Langenbecks Arch. Chir.* 341(2): 99-110; 1976.

The modalities of dysplastic epithelial modification found in rectocolonic biopsies are described and their prognostic potential relative to frank carcinoma in prolonged colitis is examined. Of 249 ulcerative colitis cases, 20 were selected with onset before 21 yr of age and with a duration of more than 10 yr. Epithelial dysplasia (ED) could be followed by rectal biopsy in seven cases, including four with multicentric carcinoma (CA) and three with multifocal ED. In one case of sigmoid CA, the rectal ED was moderately acute and, in another case, the rectal ED was slight and the colonic ED was acute (carcinoma *in situ*). Rectal and colonic ED were both moderately acute in a patient with CA of the sigmoid nd left splenic flexure. One case of transverse olon CA was associated with acute rectal ED (carinoma *in situ*). Three types of ED were established: olypoid (villous) dysplasia, ED of the crypt epihelium, and epidermoid metaplasia with cellular typia. Type 1 involves villous-type proliferation, ith frequent mitoses and a cell atypia resulting rom arrested regeneration on the border of inflamatory-ulcerative lesions; all mucous-forming poential is lost. The second type is demonstrable nly by histology and is assumed to represent the eginning of undifferentiated colitis CA. Type 1 is ssumed to be the precursor of polypoid adenocarcioma as the intercryptal stroma usually exhibits eactive hyperlasia. The third type involves a ultilevel epidermoid, differentiated epithelium, hich remains mucogenic, both in the crypts and on he surface. No invasive CA was ever associated ith the third type and thus, this type may represent n "indirect" or transitional metaplastic type.

152 EXPERIMENTAL ULCERATIVE DISEASE OF THE COLON. (Eng.) Watt, J.; Marcus, R. (Univ. iverpool, New Medical Sch., Ashton St., P.O. Box 47, Liverpool L69 3BX, England). *Methods Achiev. xp. Pathol.* 7:56-71; 1975.

n experimental guinea pig model for human ulceraive colitis is described. Ulceration is induced by eeding aqueous solutions of carrageenan from the ed seaweed *Eucheuma spinosum*. Local ulceration is roduced by the administration of 1% undegraded carrageenan over a period of 6 weeks, during which time he animals remain in good general condition. After weeks, about 50% of the animals have ulceration, nd after 6 weeks, all animals are affected. The esions are mainly in the cecum, but a few may be ound in the adjacent proximal colon. A more extensive type of ulceration results from oral administration of 5% degraded carrageenan over a period of weeks. The general condition of the animals deteriorates with this dose, and weight loss becomes apparent after 2 weeks, and may amount to 15-25% after weeks. The stool becomes loose after 1 week and contains occult blood within 2-3 weeks. Ulceration begins in the cecum between the 2nd and 3rd week and is widespread throughout the large intestine in all animals by the end of the 4th week. The ulcerative lesions produced by degraded or undegraded carrageenan display generally similar histological features, with infiltration of polymorphonuclear leukocytes and macrophages, which show metachromasia of the cytoplasm in toluidine blue-stained sections. There may be mucosal edema, capillary congestion, and extravasation of RBC. The liver may show focal fatty change and, less commonly, periportal round cell infiltration. In the kidney, hydropic vacuolation of the epithelium of the convoluted tubules is seen, as well as metachromasia in the stroma of the pyrimids and in the cytoplasm of the epithelium of the tubules and collecting ducts. The similarities of the clinico-pathological features of the model and of human ulcerative colitis are discussed. The etiology is thought to involve a direct local action in the bowel.

8153 ANIMAL MODEL: ULCERATIVE COLITIS INDUCED IN GUINEA PIGS WITH DEGRADED CARRAGEENAN. (Eng.) Anver, M. R.; Cohen, B. J. (Univ. Michigan Medical Sch., Ann Arbor, MI 48104). *Am. J. Pathol.* 84(2):431-435; 1976.

8154 GASTRITIS, DUODENITIS, AND BLEEDING DUODENAL ULCER FOLLOWING MEFENAMIC ACID THERAPY. (Eng.) Wolfe, J. A.; Plotzker, R.; Safina, F. J.; Ross, M.; Popky, G.; Rubin, W. (Medical Coll. Pennsylvania, 3300 Henry Ave., Philadelphia, PA 19129). *Arch. Intern. Med.* 136(8):923-925; 1976.

8155 CARDIOMYOPATHY COMPLICATING ULCERATIVE COLITIS [Abstract]. (Eng.) Lunde, P.; Woie, L.; Halvorsen, L. (Stavanger Hosp., Stavanger, Norway). *Scand. J. Gastroenterol.* 10(34):35-36; 1975.

8156 CHANGES IN COLONIC MYOELECTRIC ACTIVITY IN SYMPTOMATIC ULCERATIVE COLITIS [Abstract]. (Eng.) Matarazzo, S. A.; Snape, W. J., Jr.; Cohen, S. (Hosp. Univ. Pennsylvania, Philadelphia, PA). *Clin. Res.* 23(5):578; 1975.

8157 MODIFICATIONS IN THE HYDROELECTROLYTE TRANSPORT AND ELECTRICAL POLARIZATION OF THE RECTAL MUCOSA IN ULCERATIVE COLITIS [Abstract]. (Eng.) Miglioli, M.; Baldi, F.; Di Febo, G.; Ughi, M.; Biasco, G.; Lami, F.; Barbara, L. (Istituto di Clinica Medica e Gastroenterologia dell'Universita, Bologna, Italy). *Rend. Gastroenterol.* 7(3):243; 1975.

See also, 7919, 8418, 8419.

PANCREAS

8158 THE ACIDITY AND PEPTIC ACTIVITY OF GASTRIC JUICE IN HEALTHY CHILDREN AND IN CHILDREN SUFFERING FROM CYSTIC FIBROSIS OF THE PANCREAS. (Ger.) Fieber, M.; Meschede, R.; Tolckmitt, W. (Zentrum fur Kinderheilkunde, Klinikum der Justus-Liebig-Universitat, D-6300 Giessen, Feulgenstrasse 12, W. Germany). *Z. Kinderheilkd.* 120(3):199-209; 1975.

The acidity and proteolytic activity of gastric juice in cystic fibrosis (CF) children was assayed to determine whether gastric function is suppressed or compensatorily increased relative to healthy children. The sample consisted of 10 CF patients and 20 normal children of corresponding age. Using a partially hierarchical analysis of variance, the slope of the curves for the volume of gastric juice, amount of acid, and peptic activity varied significantly between groups; there was no difference in pH. The basal gastric volume increased with age in both groups. Pentagastrin-stimulated maximal gastric volume also varied directly with age, but the CF values were significantly lower. There was no group difference in peak volume output. Maximal acid secretion, but not basal acid output, increased with age. There was no variation between groups in maximal gastric volume, basal acid output, or peak acid output. Basal peptic activity increased significantly with age only in the control group, but the maximal peptic activity was age-dependent in both groups. Peak peptic output showed no group difference. Although the maximal gastric volume was smaller in the CF group, there is no evidence that gastric digestive function is abnormal.

8159 PANCREATIC ABSCESS: A CRITICAL ANALYSIS OF 113 CASES. (Eng.) Camer, S. J.; Tan, E. G. C.; Warren, K. W.; Braasch, J. W. (Lemuel Shattuck Hosp., Boston, MA). *Lahey Clin. Found. Bull.* 25(1):1-10; 1975.

A critical analysis of 113 cases of pancreatic abscess was made to define the diagnostic, therapeutic, and prognostic parameters important to management. The most common symptoms, signs, and laboratory data for patients with acute (37), chronic (29), and postoperative (47) pancreatitis included: epigastric pain, fever, anorexia, weight loss, tenderness, abdominal mass, anemia, leukocytosis, and serum amylase elevation; distention and jaundice were found more often in the postoperative cases. Culture reports were positive in 88/96; *Escherichia coli* was recovered in 45%. Radiographic examination of the chest disclosed pleural effusion, diaphragmatic elevation, and basilar atelectasis in 38 patients. There was evidence of pancreatic enlargement in 40/46 patients undergoing contrast studies. Pancreatitis and pancreatic necrosis were found in conjunction with all abscesses; a single cavity was found in 39 patients. In 6/113 the abscess was first seen at autopsy. The rest (107) underwent operative drainage. Mortalities included 5 patients in the acute group, 3 in the chronic group, and 11 in the postoperative group. Complications were varied and often multiple, notably, septicemia, renal failure, pleural effusion, wound abscess, diabetes, gastric retention, ileus, and fistula. Twelve of the 88 survivors died in the first 6 months; 49 who have been followed up for up to 17 yr (median 10 yr) are still alive. The increased survival rate and relatively smooth course of most of the patients are concluded to be the result of a timely, aggressive surgical approach, with wide debridement and drainage, and the liberal use of supportive measures.

8160 PANCREATIC PSEUDOCYST DIAGNOSED BY B-SCAN ULTRASONOGRAPHY. (Eng.) Kilcoyne, R. R.; Wilson, S. D.; Hoke, S. E. (Milwaukee County Medical Complex, 8700 West Wisconsin Ave., Milwaukee, WI 53226). *Am. J. Dig. Dis.* 20(11):1059-1062; 1975.

8161 VARIATIONS OF COELIO-MESENTERIC ARTERIES CALIBER AND PANCREAS VOLUME IN CHRONIC PANCREATIC DISEASES [Abstract]. (Eng.) Giuen, C.; Cro R. C.; Fernandes, R.; Lins, J.; Sarles, H. (INSERM U-31, Unite de Recherches de Pathologie Digestive, chemin de la Gaye, F 13009 Marseille, France). *Biol Gastroenterol. (Paris)* 9(1):55; 1976.

8162 CLINICAL EVALUATION OF IRON METABOLISM IN PANCREATIC DISEASE. (Eng.) Miyamori, A.; Takebe, T.; Yamagata, S. (Coll. Medical Sciences, Tohuku Univ., Sendai, Japan). *Tohuku J. Exp. Med.* 118(Suppl.):159-172; 1976.

8163 PANCREATIC D CELLS IN NORMAL AND PATHOLOGICAL HUMAN PANCREAS [Abstract]. (Eng.) Polak, J. M.; Bloom, S. R.; Arimura, A.; Pearse, A. G. E. (Hammersmith Hosp., Royal Postgraduate Sch. London, England). *Gut* 16(10):837; 1975.

8164 THE CASE OF THE BUBBLY PANCREAS. (Eng.) Seaman, W. B. (Columbia-Presbyterian Medical Center, New York, NY). *Hosp. Prac.* 11(3):129-130; 1976.

8165 PANCREATIC CANCER, DIAGNOSIS AND SURVIVAL [Abstract]. (Eng.) Gudjonsson, B.; Livstone, E. M.; Spiro, H. M. (Yale New Haven Hosp., New Haven, CT). *Scand. J. Gastroenterol.* 10(34): 23; 1975.

8166 CANCER OF THE PANCREAS: DETECTION AND DIAGNOSIS. (Eng.) Cohn, I., Jr. (Louisiana State Univ. Sch. Medicine, 1542 Tulane Ave., New Orleans, LA 70112). *Cancer* 37(1):582-588; 1976.

8167 CARCINOMA OF PANCREAS: A STUDY BASED ON AUTOPSY DATA FROM 1928 TO 1972 IN VIENNA, AUSTRIA. (Eng.) Parkash, O. (Wilhelminen Hosp., Vienna, Austria). *Digestion* 13(3):137-144; 1975.

8168 CLINICOPATHOLOGICAL STUDIES ON CARCINOMA OF THE HEAD OF THE PANCREAS WITH RADICAL OPERATION. A STUDY OF CARCINOMA OF THE PAPILLA OF VATER. (Jpn.) Kojima, N. (Kurume Univ. Sch. Medicine, Kurume, Japan). *Igaku Kenkyu* 44(6):95-114; 1975.

8169 PROLONGED CONTROL OF HYPOGLYCAEMIA BY L-ASPARAGINASE IN ISLET CELL CARCINOMA PRODUCING INSULIN AND GASTRIN. (Eng.) Warne, G. L.; Adie, R.; Hansky, J.; Martin, F. I. R.; Varigos, G. (Royal Melbourne Hosp., Victoria 3050, Australia). *Aust. N.Z. J. Med.* 5(5):466-468; 1975.

8170 A CASE OF WATERY DIARRHEA, HYPOKALEMIA AND HYPERCALCEMIA ASSOCIATED WITH NONULCEROGENIC ISLET CELL TUMOR OF THE PANCREAS. (Eng.) Hirose, S.; Kobayashi, K.; Kajikawa, K.; Sawabu, N.; Takeuchi, J. (Kanazawa Univ. Sch. Medicine, Kanazawa, Japan). *Am. J. Gastroenterol.* 64(5):382-391; 1975.

8171 α-AMYLASE ACTIVITY IN SWEAT AND SERUM OF PATIENTS WITH CYSTIC FIBROSIS OF THE PANCREAS. (Eng.) Nikolajek, W. P.; Emrich, H. M. (Dr. von Hauner's Children's Hosp., Univ. Munich, Munich, W. Germany). *Eur. J. Pediatr.* 122(4):289-291; 1976.

8172 CYSTIC FIBROSIS: NORMAL VOLUMES OF RED CELLS. MODEL EXPERIMENTS ON THE PATHOMECHANISM OF THE DISEASE. (Eng.) Emrich, H. M.; Heitz, J.; Katz, S.; Thom, R. (Universitats-Kinderklinik, Lindwurmstrasse 4, D-8000 Munchen 2, W. Germany).

8173 THE SECRETION OF THE HUMAN PANCREAS AS RELATED TO ACUTE ALTERATIONS IN CALCIUM HOMEOSTASIS [Abstract]. (Eng.) Goebell, H.; Hotz, J.; Ziegler, R. (Dept. Internal Medicine, Univ. Ulm, Ulm, W. Germany). *Digestion* 13(1/2):111; 1975.

8174 JUXTAPAPILLARY DIVERTICULA AND PATHOLOGICAL CHANGES OF THE BILIARY AND PANCREATIC DUCTS [Abstract]. (Eng.) Osnes, M.; Myren, J.; Swensen, T. (Ulleval Hosp., Oslo 1, Norway). *Biol. Gastroenterol. (Paris)* 9(1):64; 1976.

8175 STUDIES ON THE MECHANISM OF FAT ABSORPTION IN CONGENITAL ISOLATED LIPASE DEFICIENCY [Abstract]. (Eng.) Muller, D. P. R.; McCollum, J. P. K.; Trompeter, R. S.; Harries, J. T. (Inst. Child Health, Hosp. Sick Children, Great Ormond St., London, England). *Gut* 16(10):838; 1975.

See also, 7772, 7887, 7926, 7937, 7963, 7965, 7967, 8076, 8176, 8177, 8181, 8191, 8192, 8195, 8223, 8225, 8318, 8374.

PANCREAS

Pancreatitis

8176 INVESTIGATION OF EXOCRINE PANCREATIC FUNCTION BY CONTINUOUS INFUSION OF CAERULEIN AND SECRETIN IN NORMAL SUBJECTS AND IN CHRONIC PANCREATITIS. (Eng.) Gullo, L.; Costa, P. L.; Fontana, G.; Labo, G. (Istituto di Clinica Medica e Gastroenterologia, Ospedale Sant'Orsola, I-40100 Bologna, Italy). *Digestion* 14(2):97-107; 1976.

The value of cerulein in the functional investigation of the exocrine pancreas was assessed in 24 controls and 29 patients with confirmed pancreatitis. The pancreas was stimulated by the i.v. infusion of cerulein (100 ng/kg/hr) and secretin (1 CU/kg/hr). The infusion was continued for 90 min to determine whether prolonged stimulation improves discrimination between normal and pathologic conditions. In controls, the mean volumes, bicarbonate outputs, lipase outputs, trypsin outputs, and chymotrypsin outputs were 46-76 ml/10 min, 4.16-8.03 mEq/10 min, 77,587-85,944 U/10 min, 765-947 U/10 min, and 7,927-10,190 U/10 min, resp. In the pancreatitis patients, values were 30-39 ml/10 min, 1.60-2.57 mEq/10 min, 15,132-27,193 U/10 min, 162-331 U/10 min, and 1,634-2,909 U/10 min, resp. In the case of volume, bicarbonate output, and lipase output in controls, the values increased throughout the experiment, and the values during the final 30 min were significantly greater than those during the initial 30 min ($p<0.001$). In the case of chymotrypsin ($p<0.001$) and trypsin ($p<0.05$), the values varied throughout the experimental period, but those during the final 30 min were significantly different from those in the initial 30 min. Unlike the controls, the patients with chronic pancreatitis demonstrated a progressive reduction in secretion during infusion. Outputs for the final 30-min period were significantly lower than those for the preceding period ($p<0.05$ for volume and bicarbonate; $p<0.005$ for lipase and trypsin; $p<0.001$ for chymotrypsin). The responses for the final 30-min period gave much clearer and more complete discrimination between normal and abnormal pancreatic function than did those from the preceding 30-min period.

8177 VIRAL ANTIBODY STUDIES IN PANCREATIC DISEASE. (Eng.) Capner, P.; Lendrum, R.; Jeffries, D. J.; Walker, G. (St. Mary's Hosp., London, England). *Gut* 16(11);866-870; 1975.

In an effort to determine a possible role of acute viral infection in the etiology of pancreatic disease, the sera of 54 patients with recent acute pancreatitis, 10 with recurrent pancreatitis, 7 with chronic pancreatitis, and 10 with pancreatic carcinoma were studied. The sera of 81 age- and sex-matched controls were also studied. Among the 29 patients with acute pancreatitis in whom paired sera were tested, 2 showed fourfold rises in antibody titers against herpes simplex, and 1 of these showed a fourfold rise against varicella zoster. No other significant increases in antibody titers were found. When the sera of the 54 patients were compared with those of the controls, there was a significantly greater incidence of antibodies to Coxsackie B_3 and B_4 viruses in the pancreatitis patients (59% and 59%, resp., versus 24% and 33%, resp.). The raised antibody titers against Coxsackie B viruses did not correlate in any way with the presence or absence of other nonviral factors associated with the pancreatitis. No evidence to support the suggestion that pancreatic disease is caused by acute viral infection has been found.

8178 NEW APPROACHES TO THE MANAGEMENT OF SEVERE ACUTE PANCREATITIS. (Eng.) Blackburn, G. L.; Williams, L. F.; Bistrian, B. R.; Stone, M. S.; Phillips, E.; Hirsch, E.; Clowes, G. H. A., Jr.; Gregg, J. (Boston City Hosp., 818 Harrison Ave., Boston, MA 02118). *Am. J. Surg.* 131(1):114-124; 1976.

Experience with 77 alcoholic patients with acute pancreatitis is presented. Thirteen patients had severe protracted acute pancreatitis. Two patients had fulminant pancreatitis, and two others had pancreatic abscesses. Nine of the patients did not fulfill the criteria usually used as a basis for surgical intervention. Specific preoperative diagnosis was obtained in these patients by the aggressive use of endoscopic cannulation of the pancreatic ducts, which documented the presence of surgically correctable lesions. These patients had sustained significant malnutrition, which was corrected by an average of 2 months of nutritional support. After proper preoperative identification of a specific lesion and correction of the malnutrition, the 11 patients without fulminant disease were operated on, with no deaths or significant complications. Nine of the patients had elective procedures, which included six distal pancreatectomies and one total pancreatectomy. Severe protracted acute pancreatitis can be identified, and once categorized, it can have therapeutic implications. Improved therapeutic results can be obtained by the more aggressive use of endoscopic cannulation of the pancreatic ducts and proper nutritional support.

8179 PANCREATIC EXCRETION OF 5,5-DIMETHYL-2,4-OXAZOLIDINEDIONE IN PATIENTS WITH CHRONIC PANCREATITIS. (Eng.) Noda, A.; Hayakawa, T.; Aoki, I.; Horiguchi, Y.; Toda, Y. (Second Dept. Internal Medicine, Nagoya Univ. Hosp., Sch. Medicine, 65, Tsuruma-cho, Showa-Ku, Nagoya City, Japan). *Am. J. Dig. Dis.* 20(11):1019-1026; 1975.

The abnormal pancreatic excretion of 5,5-dimethyl-2,4-oxazolidinedione (DMO) was studied in 44 patients with chronic pancreatitis (14 with calcification and 30 without calcification). Total DMO output 60 min after secretin stimulation (1 U/kg), when calculated as the output at a level of 10 mg/100 ml of plasma DMO, was linearly related to total volume and was significantly reduced (below 30 mg, $p<0.001$) in all but three patients. Over half the patients without calcification had a decreased DMO output with normal volume secretion, but 20/30 with calcification had a low DMO output with decreased volume flow. Data on DMO excretion 30 min after pancreozymin stimulation (1 U/kg, i.v.) were less efficient in finding abnormalities in these patients. A hypothesis was advanced that DMO diffusion into the pancreatic ducts might be primarily impaired in early chronic pancreatitis, and as the inflammation progressed to the final stage, DMO outflow from the ducts to the duodenum would be disturbed, with evolving diffusion impairment of the compound. The DMO in duodenal content, when expressed in terms of a maximal concentration ratio of duodenal juice/plasma, was significantly lower in chronic pancreatitis patients during the last 40 min after secretin stimulation. The present technique may be effective in diagnosing early chronic pancreatitis.

8180 DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS OF CHRONIC PANCREATITIS. (Ger.) Blum, A. L.; Bruhlmann, W.; Peter, R.; Krejs, G. J. (Medizinische Klinik und Institut fur Rontgen-Diagnostik, Stadtspital Triemli, CH-8063, Zurich, Switzerland). *Munch. Med. Wochenschr.* 117(50):1979-1986; 1975.

8181 ANGIOGRAPHY IN CHRONIC PANCREATITIS AND PANCREATIC CANCER: A CRITICAL EVALUATION [Abstract]. (Eng.) Gortenuti, G.; Cavallini, G.; Vantini, I.; Navarro, A.; Angelini, G.; Piubello, W.; Marzoli, G.; Dobrilla, G. (Clinica Medica III, Universita di Padova, Sede di Verona, Policlinico di Borgo Roma, 37100 Verona, Italy). *Biol. Gastroenterol. (Paris)* 9(1):54; 1976.

8182 INTRAVENOUS CHOLANGIOGRAM CONTRAST MEDIUM REFLUX INTO PANCREATIC DUCT IN A PATIENT WITH ACUTE PANCREATITIS. (Eng.) Ominsky, S. H. (Hahnemann Medical Coll. and Hosp., 230 N. Broad St., Philadelphia, PA 19102). *Radiology* 111(1):97-98; 1974.

8183 ENDOSCOPIC PANCREATOGRAPHY, SCINTIGRAPHY AND EXOCRINE FUNCTION IN PANCREATITIS. A COMPARATIVE STUDY [Abstract]. (Eng.) Salmon, P. R.; Baddeley, H.; Machado, G.; Low-Beer, T.; Rhys-Davies; Trapnell, J. (Dept. Medicine, Univ. Bristol, Bournemouth, Great Britain). *Biol. Gastroenterol. (Paris)* 9(1):67-68; 1976.

8184 ENDOSCOPIC RETROGRADE PANCREATOGRAPHY IN CHRONIC PANCREATITIS AND RECURRENT ACUTE PANCREATITIS [Abstract]. (Eng.) Liguory, Cl.; Caletti, G. C.; Fontana, G.; Bolondi, L.; Gullo, L.; Costa, P. L.; Tessari, R. (Istituto di Clinica Medica II dell'Universita, Bologna, Italy). *Rend. Gastroenterol.* 7(3):244-245; 1975.

8185 PROBLEMS IN THE CLINICAL APPRAISAL OF PANCREATIC DISEASE. (Eng.) Read, G.; Braganza, J. M.; Howat, H. T. (Manchester Royal Infirmary. Univ. Manchester, Manchester, England). *Biol. Gastroenterol. (Paris)* 9(1):67; 1976.

8186 TREATMENT OF ACUTE PANCREATITIS, FROM A VIEW POINT OF CONSERVATIVE TREATMENT [Abstract]. (Eng.) Toda, Y. (Nagoya Univ. Sch. Medicine, Nagoya, Japan). *Gastroenterol. Jpn.* 10(3):239; 1975.

8187 DIAGNOSIS AND TREATMENT OF ACUTE PANCREATITIS [Abstract]. (Eng.) Kubo, K. (Center Hosp., Ube Industries, Ltd., Ube, Japan). *Gastroenterol. Jpn.* 10(3):240; 1975.

8188 THE TREATMENT OF ACUTE PANCREATITIS. (Eng.) Trapnell, J. E. (Royal Victoria Hosp., Boscombe, Bournemouth, England). *Acta Gastroenterol. Belg.* 38(5/6):171-181; 1975.

8189 TRASYLOL REVISITED: THE VALUE OF PROTEOLYTIC INHIBITORS IN THE THERAPY OF PANCREATITIS. (Eng.) Dreiling, D. A.; Leichtling, J. J.; Greenstein, A. J. (Mount Sinai Sch. Medicine, City Univ. New York, Fifth Ave. and 100th St., New York, NY 10029). *Mt. Sinai J. Med. N.Y.* 43(4):409-414; 1976.

8190 TREATMENT OF ACUTE PANCREATITIS--A CRITICAL CLINICAL ANALYSIS OF ACUTE PANCREATITIS [Abstract]. (Eng.) Nakano, S. (Ogaki Municipal Hosp., Ogaki City, Japan). *Gastroenterol. Jpn.* 10(3):239; 1975.

8191 LACTOFERRIN, A PROTEIN OF HUMAN PANCREATIC EXTERNAL SECRETION. (Eng.) Figarella, C.; Sarles, H. (Unite de Recherches de Pathologie Digestive, U-31 INSERM, 46 chemin de la Gaye, 13009 Marseille, France). *Scand. J. Gastroenterol.* 10(5):449-451; 1975.

8192 RELATION OF EXOCRINE PANCREATIC FUNCTION TO THE DIAMETER OF THE PANCREATIC AND COMMON BILE DUCTS. (Eng.) Nakajima, S.; Nakano, S.; Horiguchi, Y.; Suzuki, T. (Fujita-Gakuen Univ., Sch. Medicine, Toyoake, Aichi, Japan 470-11). *Am. J. Gastroenterol.* 65(2):142-147; 1976.

8193 PATHOPHYSIOLOGICAL CHANGE AND SEVERITIES OF ACUTE PANCREATITIS [Abstract]. (Eng.) Kubota, Y. (Ikeda City Hosp., Ikeda, Japan). *Gastroenterol. Jpn.* 10(3):239-240; 1975.

8194 RECURRENT PLEURAL EFFUSION IN CHRONIC RELAPSING PANCREATITIS. (Eng.) Rasaretnam, R.; Perera, A. B. V.; Kumarasinghe, M. (Colombo General Hosp., Sri Lanka). *Br. J. Surg.* 62(7):560-562; 1975.

8195 FISTULA FORMATION COMPLICATING PANCREATIC ABSCESS. (Eng.) Henderson, J. M.; MacDonald, J. A. E. (Chalmers Hosp., Edinburgh, Scotland). *Br. J. Surg.* 63(3):233-234; 1976.

8196 A NEW AETIOLOGY IN CHRONIC PANCREATITIS? THE PARA-AMPULLARY DUODENAL CYSTS: REVIEW OF 26 CASES [Abstract]. (Eng.) Martin, E. D. (Hopital Antoine-Beclere, F 92140 Clamart, France). *Biol. Gastroenterol. (Paris)* 9(1):53-54; 1976.

8197 CHRONIC CALCIFYING PANCREATITIS IN ITALY: HISTOLOGICAL AND CLINICAL ASPECTS. (Eng.) Gullo, L.; Fontana, G.; Costa, P. L.; Labo, G. (Istituto di Clinica II dell'Universita, Bologna, Italy). *Rend. Gastroenterol.* 7(3):244; 1975.

8198 CHRONIC CALCIFYING PANCREATITIS IN BOHEMIA [Abstract]. (Eng.) Herfort, K.; Bartos, V. (Second Res. Dept. Gastroenterology, Charles Univ., Prague, Czechoslovakia). *Biol. Gastroenterol. (Paris)* 9(1):66-67; 1976.

8199 CLINICAL STUDY ON PANCREATITIS [Abstract]. (Eng.) Iwata, S.; Nakamura, I.; Wakabayashi, A.; Hashihira, N.; Takeda, Y.; Mori, R.; Nishii, T.; Saeki, M.; Hara, M. (Osaka Medical Coll., Osaka, Japan). *Jpn. J. Med.* 14(2):137; 1975.

8200 ACUTE PANCREATITIS DUE TO PROCAINAMIDE-INDUCED LUPUS ERYTHEMATOSUS [Abstract]. (Eng.) Falko, J. M.; Thomas, F. B. (3024 Gunnison Trail, Fort Worth, TX 76116). *Ann. Intern. Med.* 83(6):832-833; 1975.

8201 ACUTE PANCREATITIS CAUSED BY CLOSED DUODENAL LOOP IN THE RAT. (Eng.) Nevalainen, T. J.; Seppa, A. (Dept. Pathological Anatomy, Univ. Turku, Finland). *Scand. J. Gastroenterol.* 10(5):521-527; 1975.

8202 THE TIMING OF BILIARY TRACT OPERATIONS IN PATIENTS WITH PANCREATITIS ASSOCIATED WITH GALLSTONES. (Eng.) Paloyan, D.; Simonowitz, D.; Skinner, D. B. (Pritzker Medical Sch., Univ. Chicago, Chicago, IL). *Surg. Gynecol. Obstet.* 141(5):737-739; 1975.

8203 ALCOHOLIC PANCREATITIS. (Eng.) Sarles, H.; Figarella, C.; Tiscornia, O. (INSERM, 46 Chemin de la Gaye, 13009, Marseilles, France). *Mt. Sinai J. Med. N.Y.* 42(6):540-551; 1975.

8204 CIRRHOSIS MAY GO WITH PANCREATITIS. STUDY SHOWS HALF OF ALCOHOLIC PANCREATITIS PATIENTS HAVE LIVER DISEASE [Abstract]. (Eng.) Anonymous. (No affiliation given). *Med. World News* 17(3):27; 1976.

See also, 7964, 7966, 8099, 8159, 8162, 8408.

8205 FUNCTIONAL CONDITION OF THE KIDNEYS ACCORDING TO THE DATA OF RADIOISOTOPE INVESTIGATIONS IN CHRONIC DISEASES OF THE LIVER AND THE BILIARY TRACT. (Rus.) Loginov, A. S.; Khodarev, N. N.; Filatov, V. I. (Inst. of Gastroenterology, Moscow, USSR). *Ter. Arkh.* 47(10):81-91; 1975.

Renal function was investigated by radioisotope methods (determination of renal plasma flow and renography) in 16 control subjects, 44 patients with chronic hepatitis, in 52 patients with liver cirrhosis, and 22 patients with chronic cholecystitis. The nephrographic changes and the reduction of the renal plasma flow were most pronounced in decompensated liver cirrhosis, chronic active hepatitis, and in chronic hepatitis associated with chronic diseases of the bile ducts. There were no substantial changes in the renal function in compensated liver cirrhosis nor was there any correlation between the morphological type of the cirrhosis and the severity of the changes in renal function. Renal changes were least pronounced in patients with chronic cholecystitis and persistent hepatitis. Treatment for the main disease brought about improvement or total normalization of the renal function in the majority of the patients with chronic hepatitis and cholecystitis, while the renal disturbances were more persistent in cirrhosis, especially in decompensated forms. Insignificant disorders of the kidney structure and common hemodynamic disorders (mild dystrophy of the tubular epithelium, focal glomerulosclerosis, cortical ischemia, and activation of the juxtaglomerular circulation), found in 18 patients who died of hepatic insufficiency, cannot explain the major functional disturbances observed, suggesting that they were due to functional circulatory disorders.

8206 EVALUATION OF LIVER SCINTIGRAPHY WITH TUMORTRACER FOR DIFFERENTIATING FOCAL HEPATIC LESIONS. (Eng.) De Roo, M. J. K.; Kiebooms, L.; Drieskens, L. (Afdeling Nucleaire Geneeskunde, Gezwelziekten, A. Z. St. Rafael Katholieke Univ., Leuven, Belgium). *J. Belge Radiol.* 58(1):1-6; 1975.

The use of liver scintigraphy with tumor tracer (^{67}Ga citrate) in combination with colloid liver scintigraphy was evaluated in 42 patients. Among 30 patients with suspected liver metastases, the procedure resulted in three false-negatives and one false-positive. Among five patients with Hodgkin's disease or malignant lymphoma, this technique was negative in four cases; one was false-negative. There were five patients with nonmalignant liver lesions. Cold zones were found in multifocal cirrhosis (3 cases) and liver cysts (1 case). A subphrenic abscess showed a zone of intense hyperactivity. These results demonstrate that using digital treatment of the scintigraphic images with substraction of the colloid scan from the tumor scan, a better identification of focal liver disease is possible.

8207 CHANGES IN LIVER FUNCTION AFTER DIFFERENT TYPES OF SURGERY. (Eng.) Clarke, R. S. J.; Doggart, J. R.; Lavery, T. (Dept. Anaesthetics, Queen's Univ. Belfast, Belfast, N. Ireland). *Br. J. Anaesth.* 48(2):119-128; 1976.

Changes in liver function were determined in patients following intermittent i.v. anesthesia or after thiopentone-methoxyflurane-muscle relaxant anesthesia and different types of surgery. Both anesthetics lasted for 60-75 min. Twenty patients undergoing minimal surgery (cystoscopy, removal of a sebaceous cyst, or superficial biopsy) received 15.4 mg/kg of thiopentone, i.v., and 20 others received 0.19 μl/kg of althesin. Forty other patients undergoing body surface surgery (herniorrhaphy, ligation and stripping of varicose veins, or total mastectomy) received either thiopentone or althesin. Maintenance was with 75% nitrous oxide in oxygen. There were no significant adverse changes in the liver function tests over the first 4 days following surgery. There was a decrease in the serum bilirubin concentration to less than the control value on the 4th day after operation. Patients who underwent body surface operations had a significantly elevated serum bilirubin level at 24 hr after surgery, but this decreased by the 4th day. In the second series of experiments, four groups of 10 patients each who were undergoing minimal, body surface, gastric, or biliary tract surgery received thiopentone (5 mg/kg) followed by tubocurarine (0.5 mg/kg), 75% nitrous oxide in oxygen, and methoxyflurane (0.2%). In the patients who underwent minimal surgery, there were no significant changes in any of the liver function tests. After body surface surgery, the serum bilirubin level increased significantly over the first 24 hr, after which it decreased to less than the control value. The increase in bilirubin after gastric surgery was similar in magnitude to the other groups at 24 hr, but increased further during the next 3 days. After biliary tract surgery, there was a steady increase in bilirubin concentration from the end of surgery. This was significant at 6 hr, reaching a mean value of 1.26 mg/100 ml at 24 hr, and remaining increased at 96 hr. After gastric operations, LDH and SGOT were increased at 1, 6, and 24 hr, and these levels were normal by 96 hr. It is clear that the anesthetics used for patients undergoing minimal surgery have no deleterious effect on liver function. The changes in the serum concentrations of intracellular enzymes were probably not related to liver function.

8208 PREDICTION OF POSTOPERATIVE HEPATIC FAILURE IN MAJOR ABDOMINAL OPERATION: CLINICAL APPLICATION OF CYTOCHROME $a(+a_3)$ ASSAY OF LIVER SPECIMEN. (Eng.) Kamiyama, Y.; Ozawa, K.; Takeda, H.; Yamaoka, Y.; Takasan, H.; Honjo, I. (Kyoto Univ. Faculty Medicine, Kyoto, Japan). *Chir. Gastroenterol.* 9(4):523-527; 1975.

A rapid, simple method for the quantitative determination of cytochrome $a(+a_3)$ in homogenates of liver biopsy material was developed as an aid to the prediction of postoperative hepatic failure in critically ill patients or patients with liver cancer. Biopsy material, weighing 0.4-1.5 g, was obtained from liver edge at operation or autopsy in 234 patients, 60 of whom had liver cancer. If the cytochrome $a(+a_3)$ level was less than 0.5×10^{-10} M/mg mitochondrial protein, the rate of severe complications after abdominal surgery was 87%, regardless of whether a major or a minor operation was performed. Patients with a cytochrome a(+a_3) level over 0.5 x 10^{-10} M/mg mitochondrial protein in the liver remnant showed a good response to major hepatic resections, even when cirrhosis was present. Among 11 patients with resectable cancer and higher levels of cytochrome a(+a_3) who underwent abdominal surgery that varied in magnitude from local excision to right hepatectomy, 9 developed no postoperative complications; 1 of the remaining patients developed transient jaundice, and the other developed marked jaundice and ascites. The latter patient had a cytochrome a(+a_3) concentration of 0.5 x 10^{-10} M/mg protein. There were no significant differences in serum albumin, SGOT, total bilirubin, prothrombin time, and BSP retention in the patients with cytochrome a(+a_3) concentrations less than 0.5 x 10^{-10} M/mg and those with greater concentrations. It is concluded that assay of cytochrome a(+a_3) concentrations can help to elucidate the hepatic functional reserve and the ability of the liver remnant to survive major hepatic resection. The authors report that this determination has been done routinely prior to major surgery, and that if the results are less than half of the normal value, extensive operations should not be carried out.

8209 THE HEPATOTOXICITY OF PARENTERAL PROTEIN HYDROLYSATE-CONTAINING SOLUTIONS. (Eng.) Garnica, A. D. (Dept. Pediatrics, Univ. Florida, Gainesville, FL 32610). *Ann. Clin. Lab. Sci.* 6(5): 446-454; 1976.

The hepatotoxicity of protein hydrolysate-containing parenteral solutions was examined in 10 infants treated with a 20% glucose solution containing either 2.5% or 3.25% protein hydrolysate. Eight infants were hospitalized because of chronic diarrhea, and two because of prematurity and respiratory distress syndrome. Their gestational ages were 30-40 weeks, and their birth weights were 1,000-3,500 g. The patients received the protein hydrolysate infusion for 5 days to 14 weeks. SGOT and SGPT were measured before initiating parenteral nutrition and then at 7- to 14-day intervals during the infusion. The SGOT levels ranged between 21 and 78 U/ml before the infusion, the level being above 28 U in seven patients. The SGPT ranged between 4 and 43 U/ml, the level being above 21 U/ml in two cases. Serum transaminase elevations occurred during the infusions in eight infants, six of whom demonstrated subsequent decreases in the course of parenteral alimentation. Cholestasis, manifested by increased serum bilirubin (6 patients), leucine aminopeptidase (4 patients), or alkaline phosphatase (2 patients), occurred in six patients, but appeared to be related to gestational age, birth weight, or intercurrent complications; two patients had inflammatory ileal disease, one patient was premature, and one patient was premature and had sepsis. Serum amino acids were measured at least once in each patient 4-7 days after parenteral feeding was begun. The average levels of aspartic acid (0.91 mg/100 ml), glutamic acid (7.22 mg/100 ml), serine (4.95 mg/100 ml), glycine (7.62 mg/100 ml), and threonine (4.40 mg/100 ml) were elevated in all 10 patients. The alanine level was high in all but two patients, who were full-term and were 17 and 9 weeks old, resp., when treated. Liver biopsies from three patients showed minimal to moderate hepatic parenchymal disease with cholestasis. The data presently available do not unequivocally indict i.v. protein hydrolysate as a significant hepatotoxin in the concentrations currently used.

8210 PHARMACOLOGICAL ASPECTS OF (+)-CYANIDANOL-3. (Eng.) Bertelli, A. *In: New Trends in the Therapy of Liver Diseases. Proceedings of the International Symposium on New Trends in the Therapy of Liver Diseases*, Tirrenia, June 6-7, 1974. (New York: S. Karger): pp. 92-99; 1975.

Data on the biochemistry, toxicology, and pharmacology of (+)-cyanidanol-3 are reviewed, and the results of studies on the protective action of this drug on toxicity induced by CCl_4, ethionine, α-naphthylisothiocyanate (ANIT), and hyperbaric oxygen are presented. (+)-Cyanidanol-3 has a low toxicity, is well tolerated, and has no apparent teratogenic effect. The administration of 10% CCl_4 solution (1 cm^3/kg) to rats produced an increase in liver lipids from a mean control level of 18.9 mg/100 mg dry weight to 54.8 mg/100 mg. The p.o. administration of 200 mg/kg of (+)-cyanidanol-3 reduced this level to 36.5 mg/100 mg, and the administration of 400 mg/kg reduced the level to 29.3 mg/100 mg. The administration of ethionine produced an increase in liver lipids from a mean control level of 2.29/100 g to 9.60/100 g; the simultaneous administration of 100 or 200 mg/kg (+)-cyanidanol-3 reduced the liver lipid content to 6.40/100 g and 5.35/100 g, resp. The lipid infiltration, biliary proliferation, and fibroblastic proliferation induced by the administration of 250 mg/kg ANIT for 50 days were reduced by the simultaneous administration of (+)-cyanidanol-3 (200 mg/kg) for the same period. Hyperbaric oxygen intoxication in mice (3.5 atmospheres) produced convulsions and death in all cases. The administration of 50, 100, or 200 mg/kg of (+)-cyanidanol-3 prior to intoxication reduced the number of animals that experienced convulsions to 60, 20, and 40%, resp., and reduced the mortality rate to 60, 10, and 30%, resp. Hyperbaric oxygen intoxication also reduced the level of cerebral ATP to 38% and the hepatic succinodehydrogenase to 46%. Treatment with 50, 100, or 200 μg/kg of (+)-cyanidanol-3 increased the level of ATP to 75, 90, and 70%, resp., and the succinodehydrogenase level to 70, 75, and 70%, resp. Treatment with only 20 or 50 μg/kg of (+)-cyanidanol-3 for 7 days increased the ATP from a control level of 35% to 80 and 115%, resp. The succinodehydrogenase level was increased from a control level of 42% to 65 and 80% by 20 and 50 μg/kg (+)-cyanidanol-3, resp. (+)-Cyanidanol-3 acts both to normalize ATP levels and to inhibit functional and morphological damage manifested by the fatty infiltration of the liver. It also has a membrane stabilizing effect.

8211 MODELS OF LIVER DISEASES. (Eng.) McLean, A. E. M. *In: New Trends in the Therapy of Liver Diseases. Proceedings of the International*

Symposium on New Trends in the Therapy of Liver Diseases, Tirrenia, June 6-7, 1974. (New York: S. Karger):pp. 2-12; 1975.

Various models of liver disease are discussed. Cell injury, fatty liver development, changes in cell function during injury, repair of damaged cells, liver cell necrosis, liver cell regeneration, reorganization of liver structure after injury, and control of blood flow through the normal and diseased liver are discussed. Model systems that are relevent to acute liver injury include acute ethanol, CCl_4, ethionine, dimethylnitrosamine, paracetamol, CS_2, and galactosamine poisoning. The oldest and best model for liver cirrhosis is that produced by repeated inhalation of CCl_4. This method has been improved by the addition of phenobarbital treatment, resulting in a more rapid and certain production of cirrhosis. Cirrhosis may also be produced by repeated paracetamol poisoning, or with the long-standing severe fatty liver of choline deficiency. α-Naphthyl isothiocyanate and thioacetamide cause massive bile duct proliferation. The concept that has provided the most insight into the initial interaction between a chemical toxin and liver cells is that toxins are stable compounds that are activated into reactive molecules in the liver cell; the reactive molecules then attack cell macromolecules and destroy some cell function, leading to cell death or carcinogenesis. The modes of hepatotoxicity of paracetamol, CCl_4, and dimethylnitrosamine are discussed in relation to this concept.

8212 LIVER DISEASE ASSOCIATED WITH ALPHA$_1$-ANTITRYPSIN DEFICIENCY IN CHILDHOOD. (Eng.)

Moroz, S. P.; Cutz, E.; Cox, D. W.; Sass-Kortsak, A. (Hosp. Sick Children, 55 University Ave., Toronto, Ontario, M5G 1X8, Canada). *J. Pediatr.* 88(1):19-25; 1976.

The clinical, laboratory, and histologic data from 18 children presenting with liver disease in early life associated with α_1-antitrypsin (α-1-AT) deficiency and protease inhibitor ZZ (PiZZ), and from 7 apparently healthy PiZZ siblings are presented. In 12 of the 18 children with liver disease, the mean level of serum α-1-AT was 28% of normal. Fourteen children presented with the neonatal hepatitis syndrome, and there was hepatomegaly in three of the four remaining children. Four patients died of liver failure or the complications of severe chronic liver disease. Three patients are alive, but have severe liver disease and persistent abnormalities on all liver function tests. Eleven patients are relatively well, six having no clinical evidence of liver disease and five having hepatomegaly. Persistent elevation of SGOT during the 3rd yr of life and renal or pulmonary problems were associated with a poor prognosis. Among the seven siblings, one had previously unsuspected liver disease and three others had minimal evidence of liver involvement. The mean serum α-1-AT concentration in the PiZZ siblings was 22% of normal. The hepatic histology was studied in 21 of the 25 PiZZ children (4 siblings). The nine children who presented with the neonatal hepatitis syndrome in whom biopsy was carried out showed the histologic characteristics of giant cell hepatitis or hepatitis. Recent liver biopsy in two children who had the neonatal hepatitis syndrome and are now 13 and 19 yr of age showed only mild to moderate periportal fibrosis. Of the four patients with no history of jaundice, two had cirrhosis and two others had portal fibrosis, which was associated with hepatitis in one. The histology was normal in two of the four siblings tested, and portal fibrosis was observed in the other two. In all cases eosinophilic inclusions occurred in the cytoplasm of hepatocytes primarily in the periportal area. This study suggests that early hepatic involvement in children with α-1-AT deficiency does not necessarily imply a poor prognosis. Although no specific treatment is available, α-1-AT deficient, PiZZ children, along with the PiZZ siblings, should be identified and examined for evidence of liver disease.

8213 FINE STRUCTURAL OBSERVATIONS OF THE LIVER IN α-1-ANTITRYPSIN DEFICIENCY. (Eng.)

Yunis, E. J.; Agostini, R. M., Jr.; Glew, R. H. (Children's Hosp. Pittsburgh, 125 DeSoto St., Pittsburgh, PA 15213). *Am. J. Pathol.* 82(2):265-286; 1976.

The membrane sites involved in the storage of α-1-anti-trypsin (α-1-AT)-like material in the hepatocytes of patients with serum α-1-AT deficiency were investigated. Liver biopsies from three children with homozygous protease inhibitor ZZ (PiZZ) deficiency and varying degrees of liver pathology were examined by light and electron microscopy. Eighty percent of the hepatocytes of the three patients contained the α-1-AT-like deposits in varying degrees. These deposits primarily occurred within dilated, smooth endoplasmic reticulum (SER), but were also in the rough endoplasmic reticulum (RER), A 9-yr-old girl with severe liver cirrhosis had the greatest amount of intrahepatic α-1-AT. Five cytoplasmic sacs containing tubules resembling paramyxovirus nucleocapsid, adjacent to α-1-AT deposits in one area, were discovered. The second patient had multiple infections and α-1-AT levels that varied considerably, making a diagnosis difficult. The hepatocytes contained significantly fewer deposits than did those of the first patient. The third patient, who died at age 5.5 months, had hypoplastic intra- and extrahepatic bile ducts, bile stasis with portal fibrosis connecting portal areas, bile duct proliferation, and biliary cirrhosis. The number of deposits was intermediate between that in the other two patients. The frequent accumulation of the deposits in the SER suggested a possible mechanism explaining the abnormality in α-1-AT deficiency in the PiZZ genotype; the following model was proposed. *N*-acetylglucosaminyl-*N*-acetylglucosamine and mannose residues are attached to nascent and completed polypeptide chains primarily in the RER. Attachment of the same sugars to completed polypeptide chains may also occur in the SER to produce the linkage and core regions of one of the four proposed oligosaccharide moieties of M-type α-1-AT. Further addition of terminal region *N*-acetylglucosamine, galactose, and sialic acid residues occurs in the Golgi apparatus. The linkage between the oligosaccharide moieties and the polypeptide hain involve asparagine residues. In the case of -type α-1-AT, one of the linkage region asparagine esidues has been replaced by some other amino acid, hereby preventing the attachment of one oligosac- haride side chain; this α-1-AT would thus accumu- ate in the smooth membranes.

214 NUCLEAR MEDICINE INVESTIGATIONS ON THE GENESIS OF ANEMIA IN CHRONIC LIVER DISEA- ES.

(Ger.) Konrad, H.; Kiencke, H.; Krueger, M.; owotny, P.; Koch, K. (Klinik fur Innere Medizin, ereich Medizin, Universitat Rostock, Rostock, E. ermany). *Radiol. Diagn. (Berl.)* 17(1):140; 1976.

ertain variables involved in the pathogenesis of nemia in chronic liver disease were examined. Vi- amin B_{12} resorption was studied in 175 cases, iron inetics in 60, RBC survival time and plasma volume n 100, quantitative excretion of fecal blood in 10, nd intestinal hemorrhage localization in 8. The verage B_{12} resorption was reduced in all patient roups, significantly in 18%. In the iron kinetics tudy, plasma iron and RBC iron turnover was elevated n 26 of the 60 patients, all of whom were anemic r had increased marrow erythropoiesis. Iron uti- ization was generally unchanged. RBC half-life as lower in all patient groups, which was implica- ed causally in 34 of the 100 patients in the RBC tudy group. In 12 cirrhotic cases, the spleen howed marked erythrocytoclasis. Plasma volume was aised only in cirrhosis; four cirrhotic patients ad dilution anemia.

215 COINCIDENCE OF HODGKIN'S DISEASE AND EPITHELOID-CELL GRANULOMAS IN LIVER AND PLEEN.

(Ger.) Stolzenbach, G.; Garbrecht, M.; ertelsmann, R.; Kastendieck, H. (II. Medizinische niversitatsklinik, 2000 Hamburg 20, Martinistr. 52, . Germany). *Dtsch. Med. Wochenschr.* 101(18):709- 11; 1976.

wo case histories of extensive epitheloid-cell ranulomas in patients with Hodgkin's disease (HD) re reported. A 34-yr-old woman had been under adiotherapeutic management of lymphocyte-rich HD or 10 yr, at which time a recurrence of cervical ode enlargement prompted a diagnosis of HD IIIA. massive conglomerate tumor was established lympho- raphically at the level of L1-L3. There were no ther significant signs or symptoms. An extensive pitheloid-cell granuloma was unexpectedly found fter splenectomy and liver biopsy without evidence f HD involvement. Bacteriology and serology were egative. Subsequent liver biopsy found only slight eactive hepatitis. The second patient, a 33-yr-old oman, presented with mixed HD, with moderate trans- minase elevation, cervical node enlargement, and light splenomegaly without pathological signs. aparotomy 3 months postradiation revealed splenic nd hepatic infiltration by epitheloid-cell granu- oma without signs of HD. Subsequent hepatomegaly as reduced with prednisone. The patient is being aintained under long-term radiation and prednisone anagement of para-iliac, para-aortic, and inquinal ode enlargement following exacerbation of lympho- yte poor HD. Epitheloid-cell granuloma is interpreted as a morphological expression of T-cell dysfunction.

8216 THE LIPID-CHEMICAL FEATURES OF THE BIOPSIED HUMAN LIVER TISSUES OF PATIENTS WITH MALIGNANT NEOPLASTIC DISEASES.

(Eng.) Nakazawa, I.; Yamagata, S.; Miura, K. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 118(Suppl.): 149-158; 1976.

Lipid and chemical changes were studied in liver biopsy specimens from 57 patients with various types of malignant neoplastic diseases, 45 patients with benign hepatic diseases, 25 patients with benign diseases not involving the liver, and 6 patients with malignant disease in combination with benign hepatic disease. In the patients with benign hepatic diseases (cirrhosis and hepatitis), the mean percentages of the fatty acids $C_{16:1}$, $C_{18:1}$, and $C_{14:0}$ (6.5%, 21.9%, and 1.43%, resp.) were increased in comparison to those in 22 controls (4.6%, 18.8%, and 1.04%, resp.), and the mean percentages of $C_{18:0}$, $C_{20:4}$, $C_{22:6}$, and $C_{18:2}$ (11.2%, 6.1%, 7.4%, and 14.0%, resp.) were decreased in comparison with controls (13.7%, 7.0%, 8.9%, and 16.7%, resp.). The most significant difference between the lipid pattern in the patients with benign or malignant disease was the ratio of fatty acid content of the phospholipid fraction to that of triglyceride; these ratios were greater than 2.20 in 40 of 47 patients with malignant neoplasms and in 3 of 4 patients with both malignant and benign disease, but were under 2.19 in 35 patients with benign disease. Four patients with early gastric cancer and one patient with early pancreatic cancer had ratios greater than 3.00. The calculation of this ratio may be useful in the diagnosis of malignant disease.

8217 STUDIES IN CHOLESTASIS OF PREGNANCY. V. GALLBLADDER DISEASE, LIVER FUNCTION TESTS, SERUM LIPIDS AND FATTY ACID COMPOSITION OF SERUM LECITHIN IN THE NON-PREGNANT STATE.

(Eng.) Samsioe, G.; Svendsen, P.; Johnson, P.; Gustafson, A. (Sahlgren's Hosp., S-413 45 Gothenburg, Sweden). *Acta Obstet Gynecol. Scand.* 54(5):417-423; 1975.

The prelavence of cholecystopathia was studied in 11 women who had pruritus gravidum and 12 women who had hepatosis of pregnancy during a preceding pregnancy. The liver function tests, serum lipids and lipoproteins, and the relative fatty acid composition of serum lecithin were also examined. The incidence of gallbladder disease, evaluated by cholecystography, was 23.7%. Among the women with previous cholestasis of pregnancy and a positive x-ray, no characteristic changes in liver function tests or serum lipids were observed. The women with a positive x-ray had a lower α-lipoprotein cholesterol than women with a negative x-ray. A characteristic finding among women with a positive x-ray was a lower relative content of palmitic acid in the serum lecithin than that found in 18 normal control women (16:0). The low palmitic acid content may suggest an influence on liver lecithin synthesis pathways, and the serum lecithin fatty acid composition may reflect similar changes in bile lecithin. The basic defect in cholecystopathia influencing liver lecithin synthesis might be the primary cause for disturbed cholesterol solubility in bile and of the frequent occurrence of gallstones in cholecystopathia of pregnancy.

8218 HEPATOMEGALY. (Eng.) Kaude, J. V.; DeLand, F. (Dept. Radiology, Box 730, Univ. Florida Coll. Medicine, Gainesville, FL 32610). *Med. Clin. North Am.* 59(1):145-167; 1975.

The radiologic diagnostic procedures in clinical use for the evaluation of hepatomegaly are reviewed. Plain roentgenograms of the abdomen are useful in identifying opacities and in determining subsequent diagnostic study. Other noncontrast studies include tomography or zonography (cut films) and chest films with or without fluoroscopy. Barium studies of the gastrointestinal tract are the best procedures for identifying a primary neoplasm or varices. For contrast studies in jaundiced patients and in those with abnormal liver function, i.v. cholangiography should be used rather than oral cholangiography, which has no value here. Two special procedures, in which contrast medium is injected directly into bile ducts, are transduodenal pancreatocholangiography and percutaneous transhepatic cholangiography. In patients with obstructive jaundice, the two combined procedures demonstrate not only the nature and extent of the disease, but also the exact site of the obstruction. Operative cholangiography can reduce the incidence of overlooked common or hepatic duct stones. Selective hepatic arteriography offers the greatest specificity of all current procedures for the investigation of liver masses. Pharmacoangiography (using bradykinin and tolazoline) has largely replaced splenoportography in investigating the portal venous system, even in determining portal hypertension. Scintigraphy and ultrasonic scanning are straightforward screening procedures usually devoid of risk. In patients with known primary malignancies, the demonstration of a hepatic mass by these procedures markedly increases the probability of a metastatic lesion, but a negative scan does not rule out the possibility of metastases, especially lesions less than 2-3 cm in diameter. Scanning is preferred in investigating parenchymatous hepatic disease and is usually satisfactory in following the results of a given treatment or after hepatic surgery.

8219 FATTY HEPATOSIS IN CHILDREN. (Rus.) Malakhovsky, Yu. E.; Likhachev, A. A.; Galin, A. A.; Mordovkin, V. B. (Kemerovo Oblast Clinical Hosp., Kemerovo, USSR). *Vopr. Okhr. Materin. Det.* 20(9):50-57; 1975.

Symptomatological, diagnostic, and etiological aspects of fatty degeneration of the liver in 29 children (aged 7 months to 12 yr) are described. The disease was diagnosed against the background of toxic pneumonia in nine cases, systemic lupus erythematosus in two, active rheumatism in two, and periarteritis nodosa and peptic ulcer of the duodenum in one each. The anamnestic investigation revealed intestinal infections with *Escherichia coli* in five patients, dysentery in two, viral hepatitis in three, giardiasis of the bile ducts in two, and hemorrhagic vasculitis in one. In many children, such diseases were associated with frequent respiratory infections (8 cases), unbalanced diet (12), repeated pneumonia (4), rickets (6), iron deficiency anemia (8), and antibiotic and hormone therapy in the past (16). In 20 cases, the clinical picture was of the "forme fruste" type. Another nine displayed symptoms characteristic of active hepatitis, and fatty liver degeneration terminated in hepatic coma in these patients. Biochemical tests revealed hypercholesterolemia in 10 patients, hyper-betalipidemia in 7, moderate hypoproteinemia with hypergammaglobulinemia in 7, high blood transaminase levels in 4, and hypoglycemia in 5. Pathomorphological examinations showed fatty degeneration of the hepatocytes in 15 cases, and large-cell fatty infiltration in 5.

8220 INVESTIGATION OF THE ABNORMAL LOW-DENSITY LIPOPROTEINS OCCURRING IN PATIENTS WITH OBSTRUCTIVE JAUNDICE. (Eng.) Kostner, G. M.; Laggner, P.; Prexl, H. J.; Holasek, A.; Ingolic, E.; Geymayer, W. (Inst. Medical Biochemistry, Univ. Graz, A-8010 Graz, Austria). *Biochem J.* 157(2):401-407; 1976.

The abnormal lipoproteins of the density range 1.019-1.063 g/cm^3 occurring in the plasma of patients with obstructive jaundice were studied. Subfractionation of this density class by combined sodium phosphotungstate precipitation, ultracentrifugation, and column chromatography on hydroxyapatite and agarose gel yielded essentially three fractions: lipoprotein-X; a triglyceride-rich lipoprotein ("lipoprotein-Y"); and an abnormal lipoprotein, lipoprotein-B. The electron microscopic appearance, hydrated densities, chemical composition, and immunochemical characteristics were markedly different. Electron microscopy revealed that lipoprotein-X had a characteristic disc-like structure, with a long axis of 50 nm and a short one of 9 nm, forming stacks. Lipoprotein-Y was composed of relatively uniform spherical particles, and stacked discs were seen only infrequently. Lipoprotein B exhibited spherical particles that were smaller than those of lipoprotein-Y. The protein moiety of lipoprotein-X consisted primarily of apolipoprotein-C and albumin. Lipoprotein-Y showed, in addition to apolipoprotein-C, the presence of apolipoprotein-B. The lipoprotein-B fraction isolated from sera of these patients had higher triglyceride and free cholesterol contents than that of normal individuals and an unusually high content of apolipoprotein-C. The relative distribution of lipoprotein-X, lipoprotein-Y, and lipoprotein-B varied from patient to patient. The importance of considering the existence of lipoprotein-Y in screening patients for cholestasis by the lipoprotein-X test is discussed.

8221 PORPHYRIA VARIEGATA. (Ger.) Hofmann, C.; Schmidt, D.; Braun-Falco, O. (Medizinische Klinik der Universitat Munchen, Munich, W. Germany). *Munch. Med. Wochenschr.* 117(50):1969-1974; 1975.

The case history of a 34-yr-old woman with porphyria variegata (PV) is described. The personal history was clinically unexceptional except for occasional eczema; the family history included paternal urticarial facial erythema on exposure to light, with a coproporphyrinuria of 244 µg/24 hr. One female offspring of the patient presented with a neurodermitis diffusa. Since pregnancy, the patient had shown increasing light-sensitivity, with erythematous involvement of both hands, lower arms, calf, and lips. In the 24-hr urine sample, the delta-aminolevulinic acid level was 5,460-9,300 µg (normal 2,392); porphobilinogen, 6,300-13,230 µg (normal 846); uroporphyrin, 40-240 µg (normal 13.6); and coproporphyrin, 1,012-1,159 µg (normal 81). The fecal levels in µg/g included uroporphyrin, 37 (normal o-trace); coproporphyrin, 393 (normal 15); and protoporphyrin, 777 (normal 24). The RBC levels in µg/100 ml were uroporphyrin, 0.4 (normal 0.99); coproporphyrin, 0.8 (normal 0.3); and protoporphyrin, 29.4 (normal 26). The high fecal excretion of proto- and coproporphyrins is differentially diagnostic of PV relative to porphyria cutanea tarda and acute intermittent porphyria. Liver biopsy was unremarkable except for slightly elevated lipopigment. All other paraclinical data were normal or borderline normal. Transmission is believed to be autosomal dominant; it is not sex-linked. Therapy consisted of protein-rich diets, supplemented by various commercial preparations.

8222 REYE SYNDROME: RESULTS OF INTENSIVE SUPPORTIVE CARE. (Eng.) DeVivo, D. C.; Keating, J. P.; Haymond, M. W. (St. Louis Children's Hosp., 500 South Kingshighway, St. Louis, MO 63110). *J. Pediatr.* 87(6):875-880; 1975.

The management and pathophysiology of 36 children (aged 5 months-15 yr) with Reye's syndrome who were hospitalized from January 1966 through June 1975 are described. Ten patients died; 7 of these deaths occurred in the 11 patients admitted between 1966 and 1971. These 11 patients were managed by various methods, without a consistent plan. The 25 patients admitted between 1972 and 1975 were staged into four groups and given a uniform pattern of care. This included: for the five stage I patients, a daily infusion of 1,600 ml/m^2 of 5-10% glucose-Isolyte M; for the 20 stage II or III patients, a continuous infusion of hypertonic glucose solution containing 300 g glucose, 40 mEq NaCl, and 30 mEq potassium acetate (14 patients) or potassium phosphate (6 patients). Twelve of the 20 were also treated with hypertonic mannitol (102 g/kg, i.v.) for 45-60 min and were electively intubated shortly after admission. These 20 patients were also given ampicillin and vitamin K (1 mg, i.v., or 5 mg, i.m.), and blood pressure, arterial gases, and various chemicals in the blood were monitored. All 19 stages I-II patients and 3 of 6 stage III patients survived. Sustained hyperglycemia in the range of 250-300 mg/dl was present during the first 60 hr of treatment, and a mixed acid-base disturbance was observed in all patients during the first 24 hr. The amount of glucose retained was 620 mg/kg/hr during the first 24 hr, and 567 mg/kg/hr during the second 24 hr. Serum calcium concentrations remained either in the normal range or slightly decreased (7.0-7.5 mg/dl). It is concluded that the reduction in the case fatality rate is due to early diagnosis, recognition of milder cases, and intensive medical support.

8223 A REVIEW OF HUMAN SOLID ORGAN TRANSPLANTATION. (Eng.) Bergan, J. J. (Natl. Inst. Health Organ Transplant Registry, Chicago, IL). *Conn. Med.* 39(8):511-513; 1975.

8224 HEPATIC TRISEGMENTECTOMY AND OTHER LIVER RESECTIONS. (Eng.) Starzl, T. E.; Bell, R. H.; Beart, R. W.; Putnam, C. W. (Univ. Colorado Medical Center, Denver, CO). *Surg. Gynecol. Obstet.* 141(3):429-437; 1975.

8225 MASSIVE RIGHT UPPER QUADRANT INTRA-ABDOMINAL INJURY REQUIRING PANCREATICODUODENECTOMY AND PARTIAL HEPATECTOMY. (Eng.) Chambers, R. T.; Norton, L.; Hinchey, E. J. (Suite 204, Phoenix Medical Center, 2155 10th Ave., Prince George, B.C. V2M 5J6, Canada). *J. Trauma* 15(8):714-719; 1975.

8226 SIGNIFICANCE OF GLUCOSE TOLERANCE AS PROGNOSTIC SIGN IN HEPATECTOMIZED PATIENTS. (Eng.) Ozawa, K.; Ida, T.; Yamada, T.; Honjo, I. (Kyoto Univ. Faculty of Medicine, Sakyo-ku, Kyoto. Japan). *Am. J. Surg.* 13(5):541-546; 1976.

8227 RADIOLOGY OF HEPATIC ABSCESS. (Eng.) Madayag, M. A.; Lefleur, R. S.; Braunstein, P.; Beranbaum, E.; Bosniak, M. (New York Univ. Medical Center, New York, NY). *N.Y. State J. Med.* 75 (9):1417-1423; 1975.

8228 LIVER ABSCESS: CASE REPORT. (Eng.) Gronmark, T.; Dingsor-Nilsen, G.; Solheim, K. (Surgical Dept., Central Lab., Telemark Sentralsjukehus, Skien, Norway). *Acta Chir. Scand.* 141(5):448-450;1975.

8229 HEPATIC ABSCESS 12 YEARS AFTER CORRECTIVE SURGERY FOR CONGENITAL BILE DUCT ATRESIA: SUCCESSFUL TREATMENT AFTER DIAGNOSTIC STUDIES WITH RADIOISOTOPE SCANNING. (Eng.) Bingaman, R.; Riley, H. D., Jr.; Bhatia, M. (Children's Memorial Hosp., Oklahoma City, OK). *Clin. Pediatr.* 15(5):482-485; 1976.

8230 AETIOLOGY OF CELLULAR IMMUNE DEFICIENCY IN ACRODERMATITIS ENTEROPATHICA [Letter to Editor]. (Eng.) Endre, L.; Katoma, Z. (Hosp. Sick Children of Buda, 1277 Budapest 23, Pf.14, Hungary). *Lancet* 1(7950):91-92; 1976.

8231 LIVER DISORDER COMPLICATING BCG TREATMENT FOR MELANOMA. (Eng.) O'Brien, T. F.; Galdabini, J. J. (Peter Bent Brigham Hosp., Boston, MA). *N. Engl. J. Med.* 293(9):443-448; 1975.

8232 CASE REPORT: TWO UNUSUAL CASES SIMULATING HEPATOMA. (Eng.) Tsega, E. (Dept. Medicine, Haile Sellassie I Univ., P.O. Box 1176, Addis Ababa, Ethiopia). *Ethiop. Med. J.* 12(2):93-100; 1975.

8233 HEPATIC HAEMANGIOENDOTHELIOMA TREATED BY IRRADIATION. (Eng.) Kornfalt, S. A.; Norgren, A.; Henrikson, H. (Barnkirurgiska Kliniken, Lasarettet, S-221 85 Lund, Sweden). *Z. Kinderchir.* 16(1):37-42; 1975.

8234 DIAGNOSIS AND TREATMENT OF SOLITARY NONPARASITIC HEPATIC CYST. (Eng.) Nakayama, F.; Tabata, M.; Nishimura, M. (Kyushu Univ. Faculty of Medicine and Health Science, Fukuoka, Japan). *Jpn. J. Surg.* 4(3):156-164; 1974.

8235 FOCAL DISEASES OF THE LIVER--LAPAROSCOPIC ASPECTS. (Ger.) Morl, M. (Oberarzt der Stoffwechselklinik der LVA Wurttemberg, 699 Bad Mergentheim, W. Germany). *Fortschr. Med.* 93(27):1288-1290; 1975.

8236 EXPLORATION AND REMOVAL OF FOCAL LESIONS OF THE LIVER (REPORT OF 32 RESECTIONS CARRIED OUT OVER A PERIOD OF 4 YEARS). (Eng.) Doutre, L. P.; Perissat, J.; Gouffrant, J. M.; Bobois, J. P.; Diard, F. (331, boulevard du President Wilson, 33200 Bordeaux, France). *J. Chir. (Paris)* 109(4):465-472; 1975.

8237 FOCAL NODULAR HYPERPLASIA OF THE LIVER: CASE REPORT. (Eng.) Uszler, J. M.; Swanson, L. A. (Harbor General Hosp., Torrance, CA). *J. Nucl. Med.* 16(9):831-832; 1975.

8238 HEPATIC HAEMATOMA IN POLYARTERITIS NODOSA. (Eng.) Ayers, A. B.; Fitchett, D. H. (St. Thomas' Hosp., London, S.E.I., England). *Br. J. Radiol.* 49(578):184-185; 1976.

8239 MEMBRANOUS GLOMERULOPATHY IN A PATIENT WITH SARCOIDOSIS. (Eng.) Salomon, M. I.; Poon, T. P.; Hsu, K. C.; King, E. J.; Tchertkoff, V. (New York Medical Coll.-Metropolitan Medical Center, New York, NY). *Arch. Pathol.* 99(9):479-483; 1975.

8240 HEPATIC RUPTURE FROM ANTICOAGULANT THERAPY [Abstract]. (Eng.) Roberts, M. H.; Johnston, F. R. (Bowman Gray Sch. Medicine, Wake Forest Univ., Winston-Salem, NC 27103). *Arch. Surg.* 110(9):1152; 1975.

8241 WHAT IS THE VALUE OF ARTERIOGRAPHY IN LIVER TRAUMA? (Fre.) Huguet, C.; Bloch, P.; Parc, R.; Bigot, R.; Monnier, J.-P.; Chermet, G. (Hopital Saint-Antoine, 184, rue du Faubourg Saint-Antoine, 75012 Paris, France). *Ann. Chir.* 30(5):351-356; 1976.

8242 A REPORT ON TWO SIBLINGS WITH "PSEUDO-ULEGYRIC TYPE" OF HEPATOCEREBRAL DISEASE. (Jpn.) Ando, S.; Shima, S.; Miyamoto, K.; Toru, M.; Takamisawa, M. (Natl. Musashi Res. Inst. Mental and Nervous Diseases, Kodaira, Japan). *Brain Nerve* 27(4):445-454; 1975.

See also, 7689, 7697, 7785, 7883, 7884, 7901, 7909, 7917, 7920, 7923, 7925, 7951, 7953, 7955, 7958, 7959, 7961, 8167, 8174, 8245, 8259, 8272, 8275, 8298, 8321, 8349, 8356, 8363, 8364, 8369, 8374, 8404.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

8243 THE STATUS OF PHOTOTHERAPY IN THE PREVENTION AND TREATMENT OF NEONATAL JAUNDICE. (Ger.) Margies, D.; Jahrig, K. (Kinderklinik, Ernst-Moritz-Arndt-Universitat, Greifswald, E. Germany). *Kinderaerztl. Prax.* 43(1):19-27; 1975.

Experiences with various modalities in the management of neonatal jaundice were critically compared. The absorption spectra of 14 different sera of icteric newborns was assayed spectrophotometrically, and the bilirubin concentration was assayed by direct photometry, radiated by blue light, and unradiated. Whole body posterior and anterior exposures were also applied to 50 premature neonates (1,260-2,500 g), 3-10 days of age, in 12 12-hourly photoperiods. *In vitro*, the bilirubin depression after a 6-hr exposure was 51.5% of initial levels, falling to extinction in another 6 hr. *In vivo*, the bilirubin decrease was 31.1% of initial values; the average pre- and postradiation serum levels were 14.11 and 9.74 mg/100 ml, resp. Birth weight, nutrition, general condition, and degree of hyperbilirubinemia had no significant effect on the result. Higher initial bilirubin levels and age at therapy reduced the photoeffect. Severe side-effects were not found. Comparatively, enzyme induction by phenobarbital and nikethamide elicited significant decreases in bilirubin, supplemented by replacement transfusion in refractory cases. Transfusion alone was least effective with premature infants, while enzyme induction alone or combined with blue light exposure was most effective in dysmature (small for gestation age) infants. Blue light therapy alone was somewhat less effective with pre- than dysmature cases. None of the methods significantly affected the RBC picture. The reduction in the number of infants with hyperbilirubinemia after blue light therapy establishes it as a valuable complementary method in icterus management.

8244 CIRCANNUAL VARIATION IN HYPERBILIRUBINEMIA OF NEONATES. (Eng.) Carletti, B.; Kehyayan, E.; Montalbetti, N.; Dansi, A.; Halberg, F.; Vaitkus, E.; Anderson, J. A.; Scheving, L. E.; Kanabrocki, E. L. (Ospedale Regina Elena, Milan, Italy). *Chronobiologia* 2(4):346-354; 1975.

Studies were carried out in the United States and in Italy to determine if there is a circadian rhythm in hyperbilirubinemia of neonates. The study covered all infants born in one hospital in Milan between January, 1970 and April, 1972 and in one hospital in Minneapolis between 1959 and 1966. The percentage of newborns with jaundice (serum bilirubin $\geq$ 10 mg%), the monthly mean maximal blood bilirubin value at any time after birth in icteric neonates, and the monthly mean of icterus length were determined in both studies. The frequency of jaundice sharply increased during the winter months in the infants born in Milan. No such rhythm occurred in the infants born in Minneapolis. Whether the findings of a circadian rhythm in the infants born in Milan is related to a reduced exposure to natural light during the winter, as compared to the rest of the year, remains to be investigated.

8245 METABOLIC DISEASES OF THE LIVER. (Eng.) Schmid, R.; Combes, B.; Leevy, C. M.; Meyer, U. A.; Ockner, R.; Schenker, S.; Thaler, M. M.; *et al.* (Work Group V, Natl. Inst. Arthritis, Metabolism, and Digestive Diseases, Bethesda, MD). *Gastroenterology* 69(5):1108-1120; 1975.

8246 CLOFIBRATE: A POTENT SERUM BILIRUBIN LOWERING AGENT IN SUBJECTS WITH GILBERT'S SYNDROME (GS) [Abstract]. (Eng.) Kutz, K.; Loffler, A.; Kandler, H.; Fevery, J. (Medizinische Poliklinik, Univ. Bonn, Bonn, W. Germany). *Digestion* 12(4/6): 255; 1975.

See also, 7797.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

8247 THE DIAGNOSTIC SIGNIFICANCE OF LIVER CELL INHOMOGENEITY: SERUM ENZYMES IN PATIENTS WITH CENTRAL LIVER NECROSIS AND THE DISTRIBUTION OF GLUTAMATE DEHYDROGENASE IN NORMAL HUMAN LIVER. (Eng.) Guder, W. G.; Habicht, A.; Kleissl, J.; Schmidt, U.; Wieland, O. H. (Klinisch-chemisches Institut, Stadt. Krankenhaus Munchen-Schwabing, D-8000 Munchen 40, Kolner Platz 1, W. Germany). *Z. Klin. Chem. Klin. Biochem.* 13(7):311-318; 1975.

The significance of markedly increased glutamate dehydrogenase activity in the sera of 16 patients with acute right-sided cardiac failure associated with high central venous pressure was investigated. The distribution of glutamate dehydrogenase was also studied in microdissected tissue samples from four patients with normal livers. The activity of glutamate dehydrogenase exceeded 1,000 U/l in the sera of over half of the 16 patients. Hepatomegaly occurred in almost all of the 16 patients. Seven patients died, and histological examination of the liver confirmed that various degrees of central liver necrosis were present in all cases. Among the 16 patients, the alanine and aminotransferase and aspartate aminotransferase activities were increased 5- to 200-fold over the normal upper limits. The absence of jaundice and the presence of normal alkaline phosphatase levels indicated that cholestasis was not present in the 16 patients. The aminotransferase activities in a group of 15 patients with acute viral hepatitis were not significantly different from those of the 16 patients; however, the ratio of alanine aminotransferase to glutamate dehydrogenase differed by a factor of 40, ranging from 0.25 to 2.2 in the patients with cardiac failure and from 15 to 138 in the patients with hepatitis. In the four microdissected normal livers, a 1.7-fold higher glutamate dehydrogenase activity was found in the central part of the liver lobule than in the peripheral portion. This higher activity could explain the relatively higher serum glutamate dehydrogenase activities found in liver diseases involving central necrosis. Glutamate dehydrogenase determinations in serum, in combination with alanine aminotransferase determinations, may be valuable in defining the degree and intralobular distribution of liver cell necrosis.

8248 HISTOPATHOLOGICAL CHANGES IN THE LIVER FOLLOWING A PARACETAMOL OVERDOSE: CORRELATION WITH CLINICAL AND BIOCHEMICAL PARAMETERS.

(Eng.) Portmann, B.; Talbot, I. C.; Day, D. W.; Davidson, A. R.; Murray-Lyon, I. M.; Williams, R. (King's Coll. Hosp. Medical Sch., London S.E.5, England). *J. Pathol.* 117(3):169-181; 1975.

The histological changes in the liver after paracetamol overdose were assessed in 104 patients, and a morphometric technique was used to determine the severity of hepatocyte loss and its relation to survival and to changes in various biochemical parameters. Thirty-eight patients developed fulminant hepatic failure. Confluent centrilobular necrosis was the most striking change seen in the liver biopsies taken up to 6 days after the paracetamol overdose. When biopsies were not taken until after 6 days, necrosis was less evident; liver cells had been largely removed, and with their disappearance, collapse of the reticulin framework occurred in the affected areas. A mild inflammatory reaction was replaced by a dense accumulation of pigmented macrophages in the area of cell loss. Fatty microvacuoles were found in surviving liver cells, and their presence seemed to parallel regenerative activity. Apparent bile ductule reduplication with great pleomorphism of component cells was a relatively late development, and it was only seen in biopsies showing extensive necrosis (grades II and III). Cholestasis was usually evident in the areas of surviving parenchyma in the more seriously affected cases. These changes corresponded in time to the appearance of deep cholestatic jaundice, which often lasted 4-8 weeks before gradual recovery ensued. Liver function tests eventually became completely normal. Seventy-seven patients survived the overdose, and only 1 of the 17 survivors whose initial biopsy showed the pattern of interlobular bridging necrosis had appreciable residual fibrosis in a follow-up biopsy taken after 1 yr. A quantitative estimate was made of the amount of surviving liver parenchyma; the hepatocyte volume fraction (HVF) in 76 biopsies performed within 10 days of the overdose correlated well with the clinical course and both with the maximal prolongation of the prothrombin time and the peak plasma bilirubin concentration in the first 10 days. An HVF value (normal 85%) of less than 40% was found only in patients who died. However, HVF measurements on biopsies from three survivors taken later than 10 days after the overdose showed that survival was possible below this critical level.

8249 HALOTHANE HEPATITIS WITH RENAL FAILURE TREATED WITH HEMODIALYSIS AND EXCHANGE TRANSFUSION.

(Eng.) Ishikawa, M.; Popovtzer, M. M. Iwatsuki, S.; Johansen, T.; Starzl, T. E. (Univ. Colorado Medical Center, Denver, CO). *Jpn. J. Surg.* 4(4):212-215; 1974.

8250 FURTHER IMMUNOLOGICAL INVESTIGATIONS IN PA TIENTS WITH POSSIBLE HALOTHANE HEPATITIS.

(Eng.) Walton, B.; Hamelin, A.; Dumonde, D. C.; Simpson, B. R. (London Hosp., Whitechapel, London, England). *Br. J. Anaesth.* 47(8):908-909; 1975.

8251 JAUNDICE AFTER ENFLURANE ANESTHESIA.

(Eng Tsang, H. S. (Mercy Center for Health Care Services, Mercy Center, Aurora, IL). *Ill. Med. J.* 148(6):593-594; 1975.

8252 HEPATITIS FOLLOWING THE USE OF METHOXYFLURANE IN OBSTETRIC ANALGESIA.

(Eng.) Rubinger, D.; Davidson, J. T.; Melmed, R. N. (Hadassah Univ. Hosp., Jerusalem, P.O. Box 499, Israel). *Anesthesiology* 43(5):593-595; 1975.

See also, 8231.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

8253 EFFECTS OF (+)-CYANIDANOL-3, A NEW FLAVONOID, IN ACUTE VIRAL HEPATITIS.

(Eng.) Borel, G. A.; Schelling, J. L.; Magnenat, P. *In: New Trends in the Therapy of Liver Diseases. Proceedings of the International Symposium on New Trends in the Therapy of Liver Diseases, Tirrenia, June 6-7, 1974.* (New York: S. Karger): pp. 170-176; 1975.

A double-blind controlled study of the effects of (+)-cyanidanol-3 in patients with acute viral hepatitis was made. Of 28 patients, 14 received the drug (1 g/day p.o. for 2 days; 2 g/day for 23 days) and 14 received a placebo. In a second study, 15 patients received only 1 g/day. No side-effects were noted. There were no differences in clinical symptoms or evolution between treated patients and

ntrols. Total serum bilirubin levels before and
ter 2 weeks of treatment were similar. However,
e $T_{1/2}$ for hyperbilirubinemia was 3.2 days in
eated patients and 4.9 days in untreated patients,
significant difference ($p<0.05$). Other liver
nction tests were similar. Patients treated with
g/day did not differ from placebo patients; there-
re this drug may only be effective at >1 g/day.

54 INDUCTIVE EFFECT OF PHENOBARBITAL IN THE TREATMENT OF PATIENTS WITH RESIDUAL PHE- MENA OF VIRAL HEPATITIS.

(Rus.) Oleinik, A. N.;
akun, N. P.; Bogachik, L. I.; Andreichin, M. A.
ernopol Medical Inst., Ternopol, USSR). *Vrach.*
lo (1):139-141; 1976.

e inductive effect of phenobarbital was studied in
animal experiment and in a clinical trial on nine
tients with residual viral hepatitis 2-6 months
ter the onset of the disease. Phenobarbital, ad-
nistered to albino male rats in daily doses of
30 mg/kg, caused considerable increases in bile
cretion and in the total quantity of bile; sti-
lated the synthesis of primary bile acids; their
njugation with amino acids; and the synthesis, con-
gation and secretion of bilirubin, without affect-
g erythrocytes. Phenobarbital had no effect on
olesterol excretion. In the clinical trials, the
tients received 0.03 mg/kg phenobarbital three
mes daily, p.o., for 10 days. General improve-
nt of well-being was noted after 2-4 days. Phe-
barbital caused favorable clinical-biochemical
anges (reduced bilirubinemia, relief of pain,
sappearance of anorexia and icteric sclera, and
rmalization of the size of the liver). The effect
phenobarbital in patients with residual symptoms
viral hepatitis is ascribed to its inductive
fect on uridinediphosphate glucuronyl transferase
l other liver enzymes.

55 THERAPY WITH CORTICOSTEROIDS IN VIRAL HEPATITIS.

(Rus.) Staroselsky, D. V.
tai Medical Inst., USSR). *Klin. Med.* 54(2):66-
1976.

rrent views on and experience with corticosteriod
erapy for acute viral hepatitis are presented.
rticosteriod therapy is indicated only for very
vere forms of viral hepatitis, exacerbations, re-
pses, and for cases showing development to chro-
form. The therapy should be initiated at an
rly stage, because even very high doses are inef-
tive at advanced stages with pronounced dystrop-
and necrotic processes in the liver. Cortico-
eroids do not reduce the time necessary for the
al normalization of the bilirubinemia. While
l administration is most efficient, it can be
plied through the umbilical vein if oral adminis-
ation is impossible. Liver necrosis may require
renteral administration. The doses should be mo-
ate (30-35 mg/day, three times daily, after
ls for prednisolone), because larger doses are
ineffective as smaller ones. The duration of
therapy averages 3 weeks, with the daily dose
ng reduced after the first 4-5 days. The course
of therapy is somewhat shorter when using dexamethasone or triamcinolone. Cases showing signs of development to chronic hepatitis may require a therapy course of 1.5-2 months with daily doses of 20-25 mg.

8256 EFFECT OF A SHORT COURSE OF HORMONE THERAPY ON VIRAL HEPATITIS.

(Rus.) Duka, T. V.; Zeigermakher, G. A.; Zhivitsa, L. V.; Komarova, E. M. (Zaporozhye Inst. Postgraduate Training Physicians, Zaporozhye, USSR). *Klin. Med.* 54(2): 70-74; 1976.

Therapeutic results obtained with short-term (5-7 days) and long-term (2-4 weeks) glucocorticoid (prednisolone) therapy in 55 children aged 1-14 yr and 80 adults aged 17-65 yr with viral hepatitis with pronounced intoxication are reported. Seventy-three patients (30 children, 43 adults) received short-term prednisolone therapy (28 mg/day, total dose 127.3 mg in children; 33-50 mg/day, total dose 165 mg in adults). Sixty-two patients (25 children, 37 adults) received long-term prednisolone therapy with decreasing doses (total 250.6 mg for children, 542.5 mg for adults). The time required for the normalization of the clinical and biochemical parameters (color of skin and sclera, bilirubinemia, size of the liver, thymol test) and the length of the hospitalization were about the same in most patients under short- and long-term therapy, while the serum bilirubin level normalized and jaundice disappeared in a significantly shorter time under short-term therapy. Side-effects (furunculosis, intestinal hemorrhage, and steroid diabetes) occurred in six cases under long-term therapy, while no side-effects were observed under short-term therapy. The findings indicate that long-term glucocorticosteroid therapy has no advantage over short-term therapy, and that short-term therapy is also applicable in cases of relative contraindications (peptic ulcer, hypertension, diabetes mellitus, prepuberty, advanced age, adipositas). Long-term therapy is indicated only for young children and cases of therapy failure of the short-term therapy.

8257 RECENT ADVANCES IN THE STUDY OF THE EPIDEMIOLOGY OF HEPATITIS B.

(Eng.) Szmuness, W. (New York Blood Center, 310 East 67th St., New York, NY 10021). *Am. J. Pathol.* 81(3):629-650; 1975.

Published and unpublished large-scale population studies of hepatitis B are reviewed. The spectrum of host responses following exposure is unusually wide. Hepatitis B appears to be one of the most widespread infections; the total number of chronic carriers of the hepatitis B antigen has been estimated as at least 120 million. The following factors have been found to be closely associated with the risk of hepatitis B: geography, sex, age at testing, age at primary infection, socioeconomic status, ethnicity, occupation, sharing a household with a carrier, sexual promiscuity, and immunologic responsiveness. Data concerning the infectivity of an asymptomatic carrier are ambiguous; whether a carrier can transmit the virus by sexual intercourse also remains unknown.

Available evidence suggests that genetic factors may be important in the aggregation and segregation of hepatitis B.

8258 VIRAL HEPATITIS IN CHILDREN. (Eng.) Rao, V. S.; Reddi, Y. R.; Rohini, K. (Inst. Child Health, Niloufer Hosp., Hyderabad, India). *Indian Pediatr.* 12(8):659-663; 1975.

The results of therapy with Liv. 52 in 120 pediatric patients with viral hepatitis are presented. Liver biopsies were carried out on admission and repeated during and after treatment at intervals varying from 3 to 12 weeks. The patients were placed into one of four treatment groups of 30: group A received Liv. 52 alone (2 teaspoons, 2 or 3 times daily or 2 tablets, 3 times daily); group B received prednisone alone (2 mg/kg for 2 weeks or 0.5-1 mg/kg for 1 week); group C received both Liv. 52 and prednisone; and group D received a placebo. The clinical, biochemical, and histopathologic recovery was earliest in group A. Jaundice disappeared clinically in a mean period of 12 days in group A, while in groups B, C, and D, the mean period was 17, 11, and 14 days, resp. The levels of serum bilirubin, thymol turbidity, transaminases, and alkaline phosphatase returned to normal in 10, 14, 18, and 16 days, resp., in group A; 18, 21, 26, and 23 days, resp., in group B; 12, 13, 21, and 16 days, resp., in group C; and 26, 30, 34, and 30 days, resp., in group D. Histopathologic recovery, in terms of complete regeneration of liver cells, decrease or disappearance of mononuclear infiltration of portal tracts, absence of vacuolation of hepatocytes and normalization of their glycogen content, occurred within 5 weeks in groups A and C; histopathologic recovery occurred in 10 and 14 weeks, resp., in groups B and D. Liv. 52 is a herbal preparation with anabolic, aperient, diuretic, stomachic, and protective effects; it also has a regenerative action on the liver. Because it is inexpensive and has no toxic side-effects, it is safe for the management of viral hepatitis.

8259 THE SIGNIFICANCE OF HB ANTIGENEMY IN APPARENTLY HEALTHY PERSONS IN THE CLINIC FOR LIVER DISEASES. (Eng.) Lesnicar, J.; Zaversnik, H.; Ferluga, D.; Kirk, C. (Hosp. Infectious Diseases, Celje Town Hosp., 63000 Celje, Yugoslavia). *Acta Hepatogastroenterol.* 22(5):297-304; 1975.

The significance of hepatitis B antigenemia was evaluated in 71 apparently healthy antigen carriers and in 120 patients who had recovered from type B hepatitis. Histologic examination of liver tissue obtained at biopsy in the 71 apparently healthy carriers revealed hepatitis persistens focalis in 41, hepatitis persistens diffusa in 15, chronic aggressive hepatitis in 3, cirrhosis in 1, acute hepatitis in 3, and normal liver or other changes in 8. None of these subjects had clinical symptoms of hepatitis. All 71 patients denied that they had had any type of hepatitis. Among the 120 patients who recovered from hepatitis, only 5% remained permanent hepatitis B antigen carriers. The results indicate that liver biopsies and follow-up examinations should be carried out in patients with hepatitis B antigenemia.

8260 CLINICAL COURSE AND PROGNOSIS OF ACUTE HEPATITIS. (Eng.) Nielsen, J. O. (Bispebjerg Hosp., Copenhagen 2400 NV, Denmark). *Ann. Cli Res.* 8(3):151-157; 1976.

Information on the clinical course and prognosis of acute viral hepatitis is reviewed with respect to t development of fulminant hepatitis and chronic live diseases. The clinical course of acute viral hepatitis varies from asymptomatic to fulminant, and th final outcome can be complete recovery, chronic hepatitis, or cirrhosis. Fulminant hepatitis appears infrequently (1-2% of patients with clinical hepatitis) in both type A and type B infections. Nearl 10% of patients with acute viral hepatitis type B (HB) develop either chronic hepatitis or cirrhosis. The exact figures for progression to chronicity in patients with type A infections are probably less, but are still not fully known. During the acute phase of the disease, the patients with later progression to chronicity differ significantly from those with subsequent resolution in a number of serological, biochemical, and morphological variables. Persistence of HB surface antigenemia for more than 13 weeks, a high concentration of circulating Dane particles, and the presence in the serum of the "e" antigenic determinant are reliable prognostic markers for progression to chronic hepatitis or cirrhosis. Such markers ar prerequisites for therapeutic trials with potent drugs, which are only justified for patients with fulminant hepatitis and patients with progression t chronicity. If the different outcome of viral hepatitis is a result of the individual thymus-derived cell function, these two categories of patients may represent the opposite extremes in lymphocytic function. Controlled clinical trials are required to evaluate the clinical effect of immunosuppression i fulminant hepatitis and immunostimulation in chroni hepatitis.

8261 SERUM IMMUNOGLOBULIN LEVELS IN HEPATITIS-B ANTIGEN-POSITIVE AND HEPATITIS-B ANTIGE NEGATIVE ACUTE HEPATITIS. (Eng.) Bersohn, I.; Ipp T.; Macnab, G. M.; Stevenson, C. M.; Miller, G. B.; Kew, M. C. (South African Inst. Medical Res. and Univ. Witwatersrand, Johannesburg 2001, South Afric *S. Afr. J. Med. Sci.* 40(1):3-8; 1975.

Because previous reports have suggested that high immunoglobulin M (IgM) concentrations may be of dia nostic value in A and B hepatitis. IgG, IgA, and I levels were measured in the sera of 73 patients wit hepatitis B antigen (HBAg)-positive acute hepatitis and 48 patients with HBAg-negative hepatitis. Ther were no significant differences between serum IgG and IgA levels in the HBAg-positive and -negative patients. The mean serum IgM level was significantly higher in the HBAg-negative patients (231 mg/100 ml) at the time of admission than that in the HBAg-positive patients (174 mg/100 ml); these levels remained significantly higher for 2-3 weeks. However, there was considerable overlap between the IgM levels in patients with and without HBAg, so that the diagnostic value of the IgM level in individual patients was limited. The mean result of the thymol turbidity test was significantly greater in the patients with HBAg-negative hepatitis (6.66 U) than those with HBAg-positive hepatitis (4.64 U), but there was considerable overlap between the values in the two groups of patients. The bilirubin, SGOT, SGPT, alkaline phosphatase, total protein, albumin, and gamma globulin levels were not significantly different in the two groups.

8262 HEPATITIS B VIRUS ANTIGENS IN ACUTE AND CHRONIC HEPATITIS AND LIVER CIRRHOSIS. CLINICAL, MORPHOLOGIC, ENZYMATIC AND IMMUNOLOGIC ANALYSIS. (Eng.) Nazarewicz, T.; Milewski, B.; Krawczynski, K.; Nowoslawski, A. (Dept. Immunopathology, State Inst. Hygiene, Warsaw, Poland). *Mater. Med. Pol.* 7(3):191-196; 1975.

The presence of hepatitis B virus (HBV) antigens in the serum and liver was compared with morphologic and clinical parameters in 235 patients with hepatitis or liver cirrhosis. Hepatitis B surface antigen (HBsAg) and hepatitis B core antigen (HBcAg) were detected in the serum and/or liver of 127 (54%) cases. Among 25 patients with acute hepatitis, 106 patients with chronic aggressive hepatitis, 18 patients with chronic persisting hepatitis, 4 patients with subacute hepatitis, and 82 patients with postnecrotic cirrhosis, the tests for HBV antigens were positive in 60%, 63%, 28%, 25%, and 50%, resp. HBV antigens were found more frequently in the liver than in the serum; the number of positive tests in the liver, serum, and liver plus serum were 68, 19, and 40, resp. Irrespective of the type of inflammation, only one antigen was found in the majority of cases (67/108): either HBsAg in the cytoplasm (42 cases) or HBcAg in the nuclei of the hepatocytes. This is thought to be due to the periodic predominance of synthesis of one or the other of the HBV antigens. This assumption was supported by the finding of the periodic appearance of HBsAg in the sera of 60 patients who were examined several times, and both HBV antigens in the liver of several patients in whom biopsy was carried out twice. In both HBV antigen-positive and -negative patients, morphologic studies of liver tissue revealed similar intensity of degenerative and inflammatory lesions in all the various forms of hepatitis and cirrhosis. Analysis of clinical symptoms and the results of biochemical tests in both groups of patients also failed to disclose any significant differences. The presence of autoantibodies, elevation of gamma globulin, immunoglobulin G (IgG), IgA, and IgM levels, and the occurrence of systemic clinical symptoms, presumably associated with circulating immunologic complexes, were also similar in both groups. The absence of diagnostically significant differences between the two groups may be taken as evidence for a common etiopathogenic mechanism responsible for the disease

8263 HBs-Ag, HBc-Ag AND VIRUS-LIKE PARTICLES IN LIVER TISSUE. (Eng.) Furuta, S.; Nagata, A.; Kiyosawa, K.; Takahashi, T.; Akahane, Y.; Koike, Y.; Sahara, T.; Iijima, Y.; Furukawa, K.; Watanabe, T.; Hara, M.; Omori, A.; Oda, M. (Second Dept. Internal Medicine, Faculty Medicine, Shinshu Univ., 3-1-1 Asahi-cho. Matsumoto, Nagano Prefecture, 390 Japan). *Gastroenterol. Jpn.* 10(3):208-214; 1975.

Immunofluorescence was used to investigate hepatitis B surface antigen (HBsAg) and hepatitis B core antigen (HBcAg) in the hepatic tissue of three patients (2 women and 1 man, aged 37-53 yr) with various liver diseases. The tissue was obtained by needle biopsy or at autopsy. Electron microscopy demonstrated viruslike particles in the nuclei. The localization of HBsAg was restricted to the cytoplasm or the surface of hepatocytes, but HBcAg was found in the hepatocyte nuclei. Hepatocytes with nuclear HBcAg were scarce in one patient in spite of the diffuse distribution of HBsAg in the liver tissue. In the other two, many hepatocyte nuclei revealed HBcAg, although the fluorescence for HBcAg was a little less than that for HBsAg. In most of the nuclei, the HBcAg displayed a diffuse granular distribution, but in some they were loose and speckled. The size of the viruslike particles was 22-27 nm in diameter. Most of them were hollow, but some were completely electron-dense, indicating that not all of the viruslike particles contained DNA. The asymptomatic HBsAg carrier with HBcAg-positive hepatocyte nuclei despite diffuse distribution of HBsAg-positive hepatocytes suggests that the hepatitis B virus infection in the carrier state results in little virus replication in the nucleus, but abundant replication in the cytoplasm. In chronic hepatitis, however, the intranuclear viruslike particles may become dominant with a concomitant decrease of viruslike material in the hepatocyte cytoplasm.

8264 SEROTYPES OF HEPATITIS B ANTIGEN (HBsAg): THE PROBLEM OF "NEW" DETERMINANTS, AS EXEMPLIFIED BY "t." (Eng.) Le Bouvier, G.; Williams, A. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Am. J. Med. Sci.* 270(1):165-171; 1975.

Recently described antigenic determinants of hepatitis B surface antigen (HBsAg) are discussed. The principal antigenic determinants of HBsAg are specified by distinct genotypes of hepatitis B virus (HBV), and include the common antigen(s), "*a*," and two pairs of subdeterminants, *d*/*y* and *w*/*r*. The members of each pair of subdeterminants are generally mutually exclusive, resulting in four primary phenotypes of HBsAg: *adw*, *adr*, *ayw*, and *ayr*. If the newer *a*(*w*) subcategories reflect differences in viral genotype, the number of phenotypes will increase to eight. Further subdivision into independent strains of HBV may eventually become feasible, on the basis of one or more of the following new HBsAg reactivities: *g*, *n*, *q*, *x*, and *t*. The requirements for accepting new reactivities as HBV-specific, and for comparing them among themselves, are discussed, using *t* as an example. A unique feature of *t* is its variable physical behavior. In overt *t*, the antigenic sites are situated at or near the Australia antigen particle surface, where they can be easily linked by immunoglobulin G molecules of anti-*t*; in cryptic *t*, the antigenic sites are able to absorb anti-*t* antibody without particle aggregation. Overt *t* reactivity is correlated with the *adw* phenotype and cryptic *t*, with the *ayw* phenotype. However, the *adr* and *ayr* phenotypes are *t*-negative. This uneven distribution may suggest that the expression of *t* is regulated by the HBV genome.

8265 ISOENZYME SPECTRUM OF LACTATE DEHYDROGENASE IN ACUTE VIRAL LIVER NECROSIS. (Rus.) Andriutsa, K. A. (Kishinev Medical Inst., Kishenev, USSR). *Klin. Med.* 54(2):57-61; 1976.

The lactate dehydrogenase (LDH) isoenzyme spectrum was studied in the sera and livers of 30 patients (10 children, 20 adults) with acute (20 cases) and subacute (10 cases) liver necrosis due to serum hepatitis (20 cases) and infectious hepatitis (10 cases). The total LDH activity and the LDH_{50} activity were increased in all patients with acute viral hepatitis prior to liver necrosis. The liver necrosis was accompanied by a significant reduction of the total LDH and LDH_{50} activities, compared with those measured before the necrosis. Further reduction of the LDH_{50} activity was observed during coma. The changes in the isoenzyme spectrum of serum LDH, and especially the changes of LDH_{50}, were more pronounced during necrosis in patients with serum hepatitis than in patients with infectious hepatitis. Compared with control patients who died of trauma, considerable reduction of hepatic fraction of LDH_{50} was measured at autopsy in patients who died of liver necrosis.

8266 A POSSIBILITY OF TRANSPLACENTAL TRANSMISSION OF THE HEPATO-ASSOCIATED ANTIGEN. (Rus.) Sakhnovskaya, G. K.; Bogdanovich, E. G.; Pristupa, M. S. (Lvov Blood Transfusion Station, Lvov, USSR). *Vopr. O khr. Materin. Det.* 21(1):53-56; 1976.

8267 ANICTERIC FORMS OF SERUM HEPATITIS. (Rus.) Paktoris, E. A.; Mikhaliuk, V. P.; Sergeeva, N. A. (D. I. Ivanovskii Inst. Virology, USSR Acad. Medical Sciences, USSR). *Vopr. Okhr. Materin. Det.* 21(3):28-31; 1976.

8268 FAMILIAL CLUSTERING OF PATIENTS SUFFERING FROM HEPATITIS B ANTIGEN (HBsAG)-RELATED LIVER DISEASES [Abstract]. (Eng.) Carrasco, D.; Berenguer, J.; Sanchez-Cuenca, J. M.; Rayon, M.; Beneyto, M.; Marty, M.; Baguena, J. (Hosp. La Fe, Valencia, Spain). *Digestion* 12(4/6):294-295; 1975.

8269 ACUTE VIRAL HEPATITIS IN PAPUA NEW GUINEA: RESULTS OF HEPATITIS B ANTIGEN AND ANTIBODY STUDIES. (Eng.) Woodfield, D. G. (Red Cross Blood Transfusion Service, Post Moresby, Papua, New Guinea). *Trop. Geogr. Med.* 27(4):339-404; 1975.

8270 HEPATITIS AND HEPATITIS-ASSOCIATED ANTIGEN (AU) IN UPPER EGYPT. (Eng.) Nooman, Z. M.; Shokair, A.; Ereiby, A. M.; Nafeh, M. A. (Dept. Medicine, Assiut Univ., Egypt). *J. Egypt. Med. Assoc.* 57(5/6):192-197; 1974.

8271 HEPATITIS-ASSOCIATED ANTIGEN IN VARIOUS POPULATION GROUPS IN UPPER EGYPT. (Eng.) Nooman, Z. M.; Nafeh, M. A.; Abul-Hassan, A.; Hussein, N. A. (Dept. Medicine, Assiut Univ. Hosp., Egypt). *J. Egypt. Med. Assoc.* 57(1/2):9-15; 1974.

8272 HEPATITIS ASSOCIATED ANTIGEN, CIRRHOSIS AND PRIMARY CARCINOMA OF THE LIVER IN THE GAMBIA. (Eng.) Ree, G. H. (Hosp. Tropical Diseases, London, England). *Trans. R. Soc. Trop. Med. Hyg.* 69(2):263-265; 1975.

8273 EPIDEMIOLOGY OF HEPATITIS B ANTIGEN AND ANTIBODY IN HOSPITAL PATIENTS IN COPENHAGEN (Eng.) Skinhoj, P. (Bispebjerg Hosp., DK-2400 Copenhagen, NV, Denmark). *Scand. J. Infect. Dis.* 7(2): 85-89; 1975.

8274 THE EPIDEMIOLOGY OF HEPATITIS B ANTIGEN AND ANTIBODY AMONG PANAMANIAN CUNA INDIANS. (Eng.) Reeves, W. C.; Peters, C. J.; Purcell, R. H. (Dept. Medicine, Univ. Washington, Seattle, WA 98195) *Am. J. Trop. Med. Hyg.* 24(5):873-875; 1975.

8275 HEPATITIS-B CORE ANTIGEN AND ANTIBODY IN PRIMARY LIVER CANCER [Letter to Editor]. (Eng.) Hadziyannis, S. J.; Karvountzis, G. G.; Manesis, E.; Merikas, G. E. (Athens Univ. Medical Sch., Hippokration General Hosp., Athens 610, Greece). *Lancet* 2(7931):418-419; 1975.

8276 CLINICAL AND HISTOLOGICAL STUDIES ON ASYMPTOMATIC CARRIERS OF HEPATITIS B ANTIGEN (HBAg) [Abstract]. (Eng.) Ichida, F.; Sasaki, H.; Tashiro, S.; Inoue, K.; Shibasaki, K.; Murayama, H.; Kamimura, T.; Inagaki, T.; Sekine, T.; Sakai, K.; Sato, E.; Yamada, S.; Fujita, K.; Nagayama, S.; Shinozaki, K. (Dept. Internal Medicine, Niigata Univ., Niigata, Japan). *Jpn. J. Med.* 14(2):129-130; 1975.

8277 MORPHOLOGY OF INFECTIOUS HEPATITIS IN CHILDHOOD WITH SPECIAL REGARD TO ANICTERIC FORMS COMMUNICATION 2: CORRELATION OF THE MORPHOLOGICAL CHANGES WITH EACH OTHER AND WITH THE SERUM CHEMICAL FINDINGS IN VIRAL HEPATITIS. (Ger.) Wiegand, U.; Gudowski, G.; Martin, H. (Kinderklinik des Bereichs Medizin [Charite], Humboldt-Universitat zu Berlin, Schumannstr. 20/21, 104 Berlin, E. Germany). *Dtsch. Gesundheitswes.* 31(24):1105-1109; 1976.

8278 SELECTION OF MORPHOLOGICAL FORMATIONS OF HEPATITIS B ANTIGEN (HBAg) [Letter to Editor]. (Eng.) Cruceanu, A.; Dumitrescu, S. M.; Portocala, R. ("Stefan S. Nicolau" Inst. Virology, 285, Sos. Mihai Bravu, Bucharest, Rumania). *Rev. Roum. Virol.* 26(1):71-72; 1975.

3279 HEPATITIS B ANTIGEN IN HEPATITIS OF CHILDHOOD. (Slo.) Virgala, J.; Cesnak, D. (In-ekcne oddelenie Krajskej detskej nemocnice, 044 00 osice, KUNZ, Czecholslovakia). *Cas. Lek. Cesk.* 115 12):357-359; 1976.

3280 BIOELECTRIC ACTIVITY OF THE BRAIN IN PATIENTS WITH VIRAL HEPATITIS. (Rus.) Vovk, . D.; Muravskaia, L. V. (Kiev Scientific Res. Inst. nfectious Diseases, Ukranian SSR Ministry Health, iev, USSR). *Vrach. Delo* (4):149-153; 1976.

281 TISSUE AUTOANTIBODIES IN PATIENTS WITH INFECTIOUS HEPATITIS. (Rus.) Krut, A. P. Dept. Infectious Diseases, Dnepropetrovsk Medical nst., Dneptopetrovsk, USSR). *Vrach. Delo* (4):146-49; 1976.

282 SPONTANEOUS IMMUNE ADHERENCE IN THE COURSE OF VIRAL HEPATITIS. (Fre.) Daniel, Ph.; aillet, J. (Laboratoire de Virologie, Faculte de edecine d'Amines, Place Victor-Pauchet, 80030 Amines, rance). *Biomedicine [Express]* 25(1):28-30; 1976.

8283 CONCENTRATION OF FUCOSE, NEUTRAL HEXOSE AND ACTIVITY OF TRANSAMINASE IN THE BLOOD OF PATIENTS WITH SERUM HEPATITIS AND INFECTIOUS HEPATITIS. (Rus.) Fedianin, I. P. (Dept. Clinical Therapy, Chita Medical Inst., Chita, USSR). *Klin. Med. (Mosk.)* 54(3):46-49; 1976.

8284 CHARACTERISTICS OF INTRAHEPATIC HEMODYNAMICS IN CHILDREN WITH VIRAL HEPATITIS ACCORDING TO THE DATA OF RHEOHEPATOGRAPHY. (Rus.) Chernova, I. V. (Dept. and Clinic Pediatrics, Cheliabinsk Medical Inst., Cheliabinsk, USSR). *Vopr. Okhr. Materin. Det.* 21(3):20-24; 1976.

8285 SOME INDICES OF CATECHOLAMINE METABOLISM IN PATIENTS WITH INFECTIOUS HEPATITIS. (Rus.) Khochava, A. I.; Sheiko, M. I. (Dept. Infectious Diseases, Grodno Medical Inst., Grodno, USSR). *Ter. Arkh.* 48(3):73-76; 1976.

See also, 7882, 7959, 7960, 8287, 8363.

LIVER AND BILIARY TRACT

Chronic Hepatitis

286 CLASSIFICATION OF CHRONIC HEPATITIS. (Eng.) de Groote, J. (Inwendige Geneeskunde, Akaemisch Ziekenhuis St-Raphael, Capucijnenvoer 35, 000 Leuven, Belgium). *Ann. Clin. Res.* 8(3):130-38; 1976.

he genesis of the classification of chronic hepatiis is reviewed. The classification systems depend n either morphological features (macroscopic and icroscopic) or on biological features (biochemical nd immunological). Chronic hepatitis is characterzed by an inflammatory invasion of the portal tract, ollowed by inflammation of the periportal area. hen portal inflammation remains within the limiting late and the parenchyma is well preserved, chronic ersistent hepatitis is present; when inflammatory ells penetrate the limiting plate into the parenchya, chronic aggressive hepatitis is present. It has een suggested that chronic hepatitis could be a link etween acute hepatitis and cirrhosis. It has been ecommended that chronic active hepatitis be further lassified according to the presence or absence of irrhosis. Lobular hepatitis, either acute or chronc, refers to localized spotty necrosis within the obule. Portal hepatitis describes the localization f inflammatory cells within the portal tract, which may or may not be accompanied by spotty necrosis. Classification according to biological criteria is also discussed. In one study, an increased gamma globulin concentration was observed in 50% of patients with chronic persistent hepatitis (diagnosed according to morphological features) and in 89% of those with chronic aggressive hepatitis. Other studies have shown that tissue antibody levels are much higher in patients with the more progressive form of disease. In less active cases of chronic aggressive hepatitis, the incidence of hepatitis B surface antigenemia was 51%, whereas this incidence was decreased in chronic persistent hepatitis.

8287 CLASSIFICATION AND INFECTIOSITY OF CHRONIC HEPATITIS B AS DEFINED BY DANE PARTICLES IN THE BLOOD AND BY VIRUS COMPONENTS IN THE LIVER. (Ger.) Gudat, F.; Bianchi, L.; Stalder, G. A.; Schmid, M. (Institut fur Pathologie der Universitat, Schonbeinstrasse 40, CH-4056 Basel, Switzerland). *Schweiz. Med. Wochenschr.* 106(24):812-824; 1976.

A diagnostic correlation between hepatitis B antigen (HBAg) in the liver and the occurrence of Dane particles (DP) in the blood was attempted in patients with active and nonactive chronic hepatitis B virus (HBV) infection. The test sample included 27 nonactive HBV patients (group A), 13 of whom had chronic persistent hepatitis (CPH) and 14 were carriers of HBAg; 22 cases of active hepatitis (group B), 19 of whom had chronic active forms (ACH) and 3 had lobular hepatitis; and 6 renal transplant patients (group C), 4 of whom had CPH, 1 with nonspecific reactive lesions, and 1 with ACH. In group A, no HB core antigen (HBcAg) was found by immunofluorescence in 19 of the 27 patients (13 nonspecific reactive and 6 CPH). One patient was positive by electron microscopy. With one exception, all of group A showed cytoplasmic HB surface antigen (HBsAg) synthesis in 5%-80% of the hepatocytes. In 17 of the 19 HBs-positive patients, no DP could be found and in the remaining 2 cases, only a single DP appeared after repeated incubation. Four patients in group A, all with CPH, showed HBcAg (5-50% of hepatocyte nuclei) simultaneously with HBsAg (up to 40% of all cytoplasms); DP were visible in each case. There were four cases with HBc predominance (1 nonspecific reactive and 3 CPH). In group B (destructive periportal inflammation with piecemeal necrosis and lobular hepatitis), 15 of the 22 patients exhibited HBc and HBs. The remaining seven cases were negative for one antigen (5 cases) or both (2). DP were always immediately present in peripheral blood, even in tissue-negative cases. In group C, there was a general tendency to HBc and HBs of HBc type, always with DP in peripheral blood. The single ACH patient was HBc-positive, with HBs of HBc type, and exhibited a plethora of DP in peripheral blood. The relation between inflammatory reaction, HBAg expression, and DP formation is compatible with the hypothesis that chronic hepatitis B is a chronic persistent viral infection in which the host response rather than the virus itself causes the hepatitis, and in which the virus persists only due to deficient host elimination.

8288 T-LYMPHOCYTES IN THE BLOOD AND HEPATIC TISSUE IN CHRONIC ACTIVE HEPATITIS.

(Rus.) Trayanova, T. G.; Severov, M. V.; Arustamova, R. G.; Gordovskaya, N. B.; Aprosina, Z. G.; Vinogradova, L. G.; Semendyaeva, M. E. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (2):45-49; 1976.

The percentages of T lymphocytes were determined in the peripheral blood and liver tissue of 10 patients with chronic persisting hepatitis, in 10 patients with other liver diseases (chronic alcoholism, functional hyperbilirubinemia, drug-induced hepatitis, hepatoma, chronic cholangitis, residual viral hepatitis, and Sjogren's syndrome), and in 35 healthy control subjects, 2 of whom underwent liver biopsy for suspected liver disease. The percentage of T lymphocytes in the blood was 34.5% in chronic persisting hepatitis, 43.3% in other liver diseases, and 59% in the controls. The percentage of T lymphocytes in the liver tissue was 52% in the active form of chronic persisting hepatitis, 43% in the other cases of chronic persisting hepatitis, 29% in other liver diseases, and 16% in the healthy controls. The increased percentage of T lymphocytes in chronic persisting hepatitis, especially in its active forms and the simultaneous decline in the peripheral blood suggest that the "hepatotropism" of T lymphocytes is a possible proof of their involvement in the path ogenesis of chronic persisting hepatitis.

8289 THE ROLE OF IMMUNODEPRESSANTS IN THE TREATMENT OF CHRONIC ACTIVE (LUPOID) HEPATITIS.

(Rus.) Tareev, E. M.; Oprosina, Z. G.; Semendiaeva, M. E.; Traianova, T. G. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (6):64-70; 1975.

The literature on immunosuppressive therapy for chronic active hepatitis is reviewed, and results of new clinical trials with such therapy are presented. Forty-seven patients received long-term therapy with a combination of azathioprine and prednisolone. Remission was achieved in 19 patient improvement was seen in 12, there was no change in 12, and progression of the disease was observed in 4. The combination of azathioprine and prednisolone was more effective and produced fewer side-effects than did the drugs separately. Ten patient who were resistant to the combination treatment received long-term antilymphocyte globulin therapy. Clinical improvement was achieved in some of these patients. These findings and the literature indicate the possibility of achieving clinical improvement and cure, and even favorable morphological changes in the liver, by immunosuppressive therapy in patients with chronic active hepatitis. Immunosuppressive therapy is indicated during the active stage of the disease, with increased serum aspartate aminotransferase activity and gammaglobulin levels, liver cell necrosis, and lymphoplasmacytic infiltration. Advanced liver cirrhosis, pronounced hepatic insufficiency, portal hypertension, chronic alcoholism, and alcohol-induced diffuse fatty degeneration constitute contraindications to immunosuppressive therapy.

8290 THE ROLE OF IMMUNOLOGICAL MECHANISMS IN CHRONIC HEPATITIS.

(Eng.) Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp. Medical Sch., London SE 5, England). *Ann. Clin. Res.* 8(3): 162-173; 1976.

The role of immunological mechanisms in chronic hep titis is reviewed. Humoral immune responses, cellu lar immunity, immune responses to hepatitis B surfa antigen (HBsAg), the link between virus-directed responses and autoimmunity, histocompatibility anti gen B8 as a marker for defective thymus-derived (T) cell function, occurrence of multisystem involvemen and drug-induced chronic active hepatitis are discussed. The association between chronic active hep titis, primary biliary cirrhosis, and various tissu autoantibodies is well-known. Smooth muscle antibody, when detected in high titer, is most closely associated with chronic active hepatitis, but it is now realized that low titers may occur in a variety of liver diseases. Antinuclear antibodies are distinctly unusual in acute viral hepatitis. Mitochon rial antibodies are found in 90-95% of all cases of primary biliary cirrhosis. These autoantibodies probably reflect an abnormal immune system, stimulated to autoantibody production by viral- or drug-induced hepatic damage. Early studies of lymphocyte function in chronic active hepatitis and primary biliary cirrhosis showed a depression of nonspecific T cell reactivity and a hypersensitivity to liver homogenates. A high molecular weight lipoprotein derived from the human hepatocyte plasma membrane was found to precipitate immune damage to the liver. Extensive *in vitro* studies confirmed the presence of cellular hypersensitivity to the liver-specific lipoprotein in over 90% of the patients with chronic active hepatitis. HBsAg-positive chronic liver disease is relatively uncommon; one studied showed that 18% of patients with chronic active hepatitis were HBsAg-positive by radioimmunoassay. No significant differences in clinical manifestations, immunoglobulin levels, prognosis, or cellular hypersensitivity to liver-specific lipoprotein were found between the HBsAg-positive and-negative groups. Cellular hypersensitivity to HBsAg was found in over 60% of HBsAg-negative patients; this incidence approaches that in patients recovering from acute B hepatitis and suggests a link between this illness and chronic active hepatitis, whether or not HBsAg is detectable. Evidence of disease in other organs of a type which, when present alone, is considered to be autoimmune, is also found in chronic active hepatitis and primary biliary cirrhosis; the commonest are Sjogren's syndrome and renal tubular acidosis. Although most cases of drug-induced hepatitis present as acute hepatitis, oxyphenisatin and methyldopa have been implicated in the etiology in some cases of chronic active hepatitis. It is postulated that the mechanism of drug-induced chronic hepatitis closely resembles that of chronic hepatitis of other etiologies.

8291 PHYTOHAEMAGGLUTININ-INDUCED LYMPHOCYTE TRANSFORMATION AND HISTOLOGIC FINDINGS IN PATIENTS WITH CHRONIC AGGRESSIVE HEPATITIS BEFORE AND DURING IMMUNOSUPPRESSIVE THERAPY. (Eng.) Pappas, A.; von Seebach, H. B.; Schwarze, G.; Reikowski, H.; Jost, H.; Jung, M.; Scheurlen, P. G. (Medizinische Kinik, Universitat des Saarlandes, D-665 Homburg, W. Germany). *Beitr. Pathol.* 156(3):197-207; 1975.

To determine whether chronic aggressive hepatitis is an autoimmune process and to evaluate the parameters that could be used to evaluate the effect of immunosuppressive therapy in this disease, the serum immunoglobulin concentration, serum auto-antibodies, and the *in vitro* transformation potential of phytohemagglutinin-stimulated blood lymphocytes were determined in 19 patients with chronic aggressive hepatitis. In most cases, these determinations were carried out prior to and during therapy with azathioprine (2 cases), corticosteroid (2 cases), or combined therapy (15 cases). The mean incorporation of ^{14}C-thymidine following PHA stimulation was significantly lower in 15 untreated patients (2,105 disintegrations per min) in comparison with that in 47 controls (4,649 disintegrations per min, $p<0.0005$). A mean incorporation level of 3,530 disintegrations per min occurred in 10 patients who received immunosuppressive treatment. Following the cessation of treatment in four of six patients, the incorporation had decreased again to a mean level of 2,122 disintegrations per min. Anitnuclear factors and antibodies against smooth muscle were demonstrated transiently in only two patients, prior to immunosuppressive therapy.

8292 CHANGES IN SERUM LIPIDS AND SERUM LIPOPROTEINS IN ACUTE HEPATITIS. (Ger.) Mordasini, R. C.; Berthold, S.; Schlumpf, E.; Riva, G. (Medizinische propadeutische Klinik der Universitat, Tiefenauspital, CH-3004 Bern, Switzerland). *Schweiz. Med. Wochenschr.* 106(35):1173-1182; 1976.

The degree of change in serum lipids and lipoproteins and their temporal relation to phases of acute hepatitis are compared with conventional paraclinical criteria. The test group included 50 cases of acute hepatitis that were diagnosed early; of the 50, 26 were Australia antigen (Au)-positive. Both triglycerides and total lipids increased during the initial 3 weeks of illness in the Au-positive patients and normalized in the 4th week in uncomplicated cases. Serum cholesterol remained unchanged for 4 weeks, then increased slightly, except in frank cholestasis. During the acute phase, phospholipids were also normal. In Au-negative cases, the same serum patterns occurred but were much less pronounced. In Au-positive cases, α- and preβ-lipoproteins disappeared during the initial 2 weeks of the disease, and then reappeared in the 3rd week; β-lipoproteins increased, and then decreased in the 3rd week. All were normalized by the 4th week. No preβ disappearance or β elevation occurred in Au-negative patients. In cases of cholestatic involvement, there was pronounced hypertriglyceridemia and elevated cholesterol and phospholipids, which paralleled enzyme lipoprotein X and α- and preβ extinction. There was no difference between the Au-positive and -negative cases. In 6 of the 50 patients with protracted hepatitis, the same variables increased but remained elevated longer, and the same variables decreased, but remained suppressed longer. There was unequivocal parallelism in Au-positive cases between lipid modification and transaminase activity, although SGOT and SGPT did not return to normal as rapidly as did serum lipids. However, the correlation between hypertriglyceridemia and increased bilirubin, transaminases, alkaline phosphatase, and other enzymes was statistically insignificant, since lipid changes were negligible in some severely involved acute hepatitis cases or were prominent in some relatively benign phases. Transaminase and lipid-lipoprotein patterns were especially unrelated in Au-negative patients. It is concluded that serum lipid and lipoprotein assays should not be an obligate part of liver function tests.

8293 THE DIAGNOSTIC SIGNIFICANCE OF IMMUNOGLOBULIN DETERMINATION IN CHRONIC LIVER DISEASES. II. RELATIONSHIPS BETWEEN IMMUNOGLOBULIN CHANGES AND DEGREE OF ACTIVITY. (Ger.) Ortmans, H.; Wildhirt, E.; Welcke, U.; Tucke, M. (Medizinische Klinik I, Stadt-Krankenhaus, D-3500, Kassel, W. Germany). *Munch. Med. Wochenschr.* 117(50): 1975-1978; 1975.

The relation between immunoglobulins (Ig) and gamma-glutamyl transpeptidase (GGT), alkaline phosphatase (AP), and the aminotransferases (SGOT and SGPT) in chronic liver disease was explored. The clinical sample included 715 patients divided into 13 nosological categories and 60 subjects with unaffected livers. Highly significant correlations prevailed in liver fibrosis for IgA-IgG, IgM-IgG, IgG-SGOT, and IgG-SGPT. No significant correlation was found in acute or persistent hepatitis. IgA-IgG in chronic active and necrotizing hepatitis and IgG-AP in chronic persistent hepatitis were also significantly correlated. Only IgG-SGOT were significantly correlated in hepatitic, eryptogenetic, or postnecrotic cirrhosis. Positive correlations for IgG-SGOT, IgA-AP, IgG-IgA, and IgG-SGPT existed in toxic cirrhosis, while siderocirrhosis had negative significant correlations for IgM-IgA, IgM-GGT, and IgG-SGOT, with IgA-AP positive. Primary liver cancer in cirrhosis was positive for IgG-IgA, IgG-IgM, IgA-IgM, IgA-SGPT, and IgM-AP, but negative for IgA-AP. Negative significant correlations obtained for IgM-GGT, -SGPT, and -SGOT in primary hepatobiliary disease. IgA-SGPT, IgM-SGPT, IgA-SGOT, IgM-SGOT, IgA-IgM, IgG-GPT, and IgG-SGOT were significantly correlated in cholangitis, but IgA-AP and IgG-GGT were negative. In nutritionally-induced fatty liver only IgG-AP was negative, while IgA-SGOT, IgA-GGT, IgM-SGPT, IgG-IgA, and IgG-GGT were positively correlated. All values were positively correlated in toxic fatty liver, including IgA-GGT, IgA-IgG, IgA-AP, IgA-SGOT, IgG-SGOT. IgG-SGOT, IgG-SGPT, and IgM-SGOT were significantly correlated in toxic hepatitis.

8294 VIRAL ANTIBODIES AND CHRONIC LIVER DISEASE. (Eng.) Scott, B. B.; Hambling, M. H.; Losowsky, M. S. (St. James' Hosp., Leeds LS9 7TF, England). *Biomedicine [Express]* 25(5):163-167; 1976.

Serum rubella, measles, and cytomegalovirus antibodies were determined in 69 patients with chronic liver disease and compared with those of age-matched controls. There were 33 patients with chronic active hepatitis (CAH), 16 with cryptogenic cirrhosis, and 20 with alcoholic cirrhosis. All three antibodies were significantly increased in CAH, and rubella antibodies were increased in patients with cryptogenic cirrhosis, but to a lesser extent. None of the antibodies was increased in patients with alcoholic cirrhosis. There was no correlation between increased antibody titers and the use of steroids. In CAH and alcoholic cirrhosis patients, there was no correlation between increased antibodies and the presence of portal systemic shunts (surgical or definite esophageal varices), and in the patients with cryptogenic cirrhosis, there was no correlation between antibody titer and surgical shunts, compared with normal shunts. In the patients with CAH, there were significant correlations between increased measles antibodies and positive tests for smooth muscle antibody ($p<0.01$) and antinuclear factor ($p<0.01$), but not for mitochondrial antibody. The findings suggest that the elevated titers are not the result of steroid therapy, liver damage, or of portal systemic shunting, but that they may be specifically associated with CAH.

8295 CHROMOSOMAL ABNORMALITIES IN LYMPHOCYTES FROM CHRONIC HEPATITIS PATIENTS (LONG-TERM CULTURES) [Abstract]. (Eng.) Fasce, L.; Vianello, M. G.; Tolentino, P. (Dept. Pediatrics, Univ. Genova, Genova, Italy). *Digestion* 12(4/6):303; 1975

8296 LYMPHOCYTE CYTOTOXICITY TO AUTOLOGOUS LIVER CELLS IN CHRONIC ACTIVE HEPATITIS [Abstract]. (Eng.) Wands, J. R.; Isselbacher, K. J (No affiliation given). *Acta Hepatogastroenterol. (Stuttg.)* 22(6):424; 1976.

8297 SIGNIFICANCE OF THE HIGH IMMUNOGLOBULIN LEVELS IN CHRONIC HEPATITIS PATIENTS [Abstract]. (Eng.) Jannuzzi, C.; Campelli, A.; Fabbri A.; Marazzi, M. G.; Tassara, A.; Tolentino, P. (Dept Infectious Diseases, Univ. Genova, Genova, Italy). *Digestion* 12(4/6):316; 1975.

8298 FAILURE OF CUSTOMARY TREATMENT IN CHRONIC ACTIVE LIVER DISEASE: CAUSES AND MANAGEMENT. (Eng.) Schalm, S. W.; Ammon, H. V.; Summerskill, W. H. J. (Mayo Clinic Foundation and Medical Sch., Rochester, MN). *Ann. Clin. Res.* 8(3):221-227; 1976.

8299 TREATMENT OF LIVER DISEASES [Abstract]. (Eng.) Okumura, H.; Takazawa, T.; Fukuda, N.; Aramaki, T.; Yano, T.; Takano, T.; Kikuchi, K.; Katsuta, Y.; Satomura, K.; Yoneda, T.; Kimura, E. (Nippon Medical Sch., Tokyo, Japan). *Jpn. J. Med.* 14(2):143; 1975.

See also, 7959, 7960, 7961, 8205, 8262, 8293.

Alcoholic Liver Disease

300 RELEVANCE OF BIOCHEMISTRY IN DIAGNOSIS AND
DEVELOPMENT OF ALCOHOLIC LIVER DISEASE.
Ger.) Ortmans, H.; Eisenberg, K. (Medizinische
linik I, Stadtkrankenhaus, Monchebergstrasse 42,
500 Kassel, W. Germany). *Med. Klin.* 71(9):380-384;
976.

he differential diagnostic value of certain biochem-
cal variables in liver disease is reexamined. The
atient population included 16 cases of fatty liver
f nutritional origin (FLN), 41 cases of fatty
iver of toxic origin (FLT), 52 with chronic alcohol
epatitis (CAH), and 96 with alcohol-induced cirrho-
is (AC). The γ-glutamyl transpeptidase (GGT) level
as normal in 63%, 5 times higher than normal in 31%,
nd 10 times higher than normal in 6% of the cases
f FLN. In FLT only 20% were normal, 49% were 5
imes higher, 17% were 10 times higher, and 14% were
ore than 10 times higher than normal. The SGOT was
ormal in 81% of FLN, with 19% showing fivefold ele-
ations. Normal SGOT occurred in 44% of FLT, with
9% 5 times higher and 7% 10 times higher than nor-
al. The SGPT was normal in 75% of FLN and elevated
ivefold above normal in 25%; 51% of FLT were normal
nd 49% were fivefold higher. Alkaline phosphatase
AP) was five times higher than normal in 6% of FLN
nd 20% of FLT. Bromthalein test (BT) values were
times higher than normal in 46% of the cases, and
ere 10 times higher in 8% of the FLN cases, while
6% of FLT were 5 times higher. Among the CAH only,
% had normal levels of GGT, with 54% 5 times, 17%
0 times, and 23% more than 10 times above normal.
GOT was increased 5-fold in 60%, 10-fold in 15%,
nd above 10-fold in 4%, while SGPT was elevated 5-
old in 48% and 10-fold in 6%. AP was normal in 60%
nd 5 times higher in 40%; BT was 5-fold and 10-fold
bove normal in 55% and 7%, resp. In AC, the GGT
alues were normal in 8%, with 50% 5 times above nor-
al, 10 times above normal in 21%, and in 21%, more
han 10 times above normal. SGOT was elevated 5
imes in 73%, 10 times in 5%, and more than 10 times
n 5%, while SGPT had risen 5-fold in 41%, 10-fold
n 2%, and above 10-fold in 2%. The highest AP va-
ues were found in AC, with 69% 5-fold higher, 29%
0-fold higher, and only 2% normal. There were no
ormal retention levels in AC, with BT 5 and 10 times
igher in 97% and 3%, resp. Application of dis-
riminant analysis found no biochemical distinction
ossible in fatty liver but a clear distinction be-
ween toxic hepatitis and cirrhosis was possible,
specially with BT. CAH and FLN or FLT were also
iscriminable, according to AP, SGOT, and SGGT,
ndependent of steatotic pathogenesis.

301 LIVER DAMAGE IN CHRONIC ALCOHOLICS WITH
AND WITHOUT DELIRIUM TREMENS. ITS INCI-
ENCE, SEVERITY AND REGRESSION. (Ger.) Bode, J.
h.; Woltge, E.; Kahm, O.; Korb, G. (Medizinische
niversitatsklinik, 3550 Marburg, Mannkopffstr. 1,
. Germany). *Dtsch. Med. Wochenschr.* 101(29):1081-
087; 1976.

he frequency and degree of liver trauma in chronic alcoholism is examined. The clinical sample consisted of 371 men, including 70 with icterus, 25 with gastric or duodenal ulcer, 26 with gastric resection, 7 with cholecystitis, 7 with pancreatitis, and 12 with manifest or latent diabetes. No correlation was found between the extent or type of liver damage and the rate or duration of alcohol consumption; although 85% of the sample had some degree of liver involvement. Within 1.5-4 weeks of abstinence, the most acutely affected livers began to normalize. Among the 10-yr drinkers, the patient population eventually fell from 15% to 5%; among the 10-20-yr drinkers, the population fell from 16% to 11%; and among the more-than-20-yr drinkers, it fell from 19% to 16%. Normalization of the delirium tremens group, which had the most severe liver injury, involved fewer patients. Liver biopsy in 85 cases found 51% with fatty liver, 43% with fibrosis, 21% with hepatitis, 20% with cirrhosis, 15% with cholestasis, and 10% with "hepatopathy" in the group with 15 or more years of abuse. The group with less than 15 yr of abuse induced 58% with fatty liver, 18% with fibrosis, 11% with hepatitis, 9% with cirrhosis, 11% with cholestasis, and 19% with "hepatopathy."

8302 LIVER BIOPSY AND LIVER FUNCTION TESTS IN 28 CONSECUTIVE LONG-TERM ALCOHOLICS. (Eng.) Kyosola, K.; Salorinne, Y. (Maria Hosp., Helsinki, Finland). *Ann. Clin. Res.* 7(2):80-84; 1975.

8303 INCORPORATION OF ETHANOL IN A TOTALLY LIQUID DIET: A NEW EXPERIMENTAL MODEL OF ALCOHOLIC LIVER INJURY IN THE BABOON [Abstract]. (Eng.) Lieber, C. S.; DeCarli, L. M.; Rubin, E. (Bronx Veterans Admin. Hosp., New York, NY). *J. Med. Primatol.* 4(6):334-335; 1975.

8304 EVOLUTION AND NATURE OF MALLORY'S ALCOHOLIC HYALINE BODY [Abstract]. (Eng.) Yalcin, S.; Schaffner, F. (Medical Clinic, First Medical Faculty, Istanbul, Turkey). *Digestion* 12(4/6): 363; 1975.

8305 THE PATHOGENESIS OF ALCOHOLIC HEPATITIS AND CIRRHOSIS. Strickland, R. G.; Miller, J. V. (Univ. New Mexico, Sch. Medicine, Albuquerque, NM). *Aust. N.Z. J. Med.* 6(1):78-81; 1976.

8306 CHOLESTATIC LESIONS OF THE LIVER OF ALCOHOLIC ETIOLOGY (MORPHOLOGICAL STUDY). (Rus.) Bliuger, A. F.; Kartashova, O. I.; Maksimova, L. A.; Zaltsmane, V. K.; Saldava, L. A.; Golubov, I. S. (Riga Medical Inst., Riga, USSR). *Arkh. Patol.* 38(2):72-77; 1976.

See also, 7805, 7809, 8178, 8203, 8245, 8262, 8310.

Cirrhosis

8307 LATE RESULTS AFTER SO-CALLED PRESSURE-ADAPTED HEPATIC ARTERIALIZATION AND PORTACAVAL SHUNT. (Ger.) Zimmermann, H.-B.; Burger, K.; Wagner, K.; Schneider, G.; Schimmelpfennig, W.; Schmidt, P. K. H. (II. Medizinische Klinik des Bereiches Medizin (Charite), Humboldt-Universitat, DDR-104 Berlin, Schumannstr. 20/21, E. Germany). *Zentralbl. Chir.* 100(1):40-46; 1975.

The postoperative onset of an acute portacaval encephalopathy in one patient and icterus in two other patients following portal vein arterialization via iliac-portal saphenous bypass prompted reconsideration of the operation. Four cirrhotic patients had received the operation. All patients were improving postoperatively until one 47-yr-old woman succumbed 6 weeks later from liver failure and intractable hydrops universalis; two other cases developed hemolytic icterus. All had slightly elevated alkaline phosphatase levels. The elevated pressure in the arterialized portal vein stump was 60-100 mm Hg 12 months postoperatively, compared to 23-32 mm Hg before the shunt and 20-30 mm Hg immediately after arterialization. Saphenous bypass angiography showed typical dilation of the portal stump and portal vein branches bilaterally, with the peripheral portal branches constricted. Small portal vessels were no longer demonstrable, confirming reduced vascularization of certain parenchymal areas. The liver was reduced in size, and heavy stromal increases were found histologically. The maintenance of pressure adaptation in the intrahepatic portal vein, remains unsolved.

8308 EFFECT OF LIGATION OF THE SPLENIC ARTERY ON PORTOHEPATIC CIRCULATION. (Rus.) Patsiora, M. D.; Ershov, Yu. A.; Kharazov, F. V.; Danilyanz, E. V. (All-Union Scientific Res. Inst. of Clinical and Experimental Surgery, Moscow, USSR). *Khirurgiia (Mosk.)* (11):82-85; 1975.

The therapeutic effect of splenic artery ligation in 28 patients with extrahepatic portal hypertension and 52 patients with intrahepatic portal hypertension is described. Additional surgical interventions included splenorenal anastomosis in 16 cases, gastrotomy in 17, omentohepatodiaphragmopexy in 12, displacement of the spleen into the retroperitoneal cavity in 29, and denervation of the hepatic artery in 6. Blood flow and blood chemical examinations revealed splenic artery ligation to be effective as an auxillary means of hepatic arterialization in patients with initial liver cirrhosis, but not in patients with extrahepatic portal hypertension or at advanced stages of liver cirrhosis. Ligation of the splenic artery is not recommended in cases of negative and aminophylline tests. Ligation of the splenic artery may be justified in patients with extrahepatic portal hypertension in case of hemorrhage from the esophageal veins.

8309 MORPHOLOGICAL FEATURES: THEIR USEFULNESS IN THE DIAGNOSIS, PROGNOSIS, AND MANAGEMENT OF CIRRHOSIS. (Eng.) Baggenstoss, A. H. (No affiliation given). *Clin. Gastroenterol.* 4(2):227-246; 1975.

The contribution of pathologic morphology to the diagnosis, prognosis, and management of cirrhosis is reviewed. The reliability of a histological diagnosis depends on the nature of the studies, the size of the biopsy and the manner in which it is taken, and on the type of cirrhosis. A correct classification can be achieved to a variable extent on the basis of morphological pattern, degree of development, activity of the inflammatory process, and, most importantly, etiological factors. Four morphological patterns have been identified: micronodular, macronodular, mixed micro- and macronodular, and incomplete septal (multilobular). Etiological factors provide the most useful classification, and a summary is given of typical morphological changes associated with distinct etiological types: alcoholic cirrhosis, posthepatitic cirrhosis, secondary (obstructive) biliary cirrhosis, primary biliary cirrhosis, Wilson's disease, and cirrhosis associated with α_1-antitrypsin deficiency. Once cirrhosis has developed, the difficulty of ascertaining the etiology is compounded by the gradual disappearance of the various cytological and histological alterations characteristic of the original injury. The importance of the pathological impression of etiology to clinical management is emphasized.

8310 EXTRAHEPATIC MANIFESTATIONS OF CIRRHOSIS. (Eng.) Martini, G. A. (No affiliation given). *Clin. Gastroenterol.* 4(2):439-460; 1975.

Manifestations of cirrhosis in organs and tissues other than the liver are reviewed. A variety of skin changes may occur, and vascular changes include telangiectasias, the arterial spider, white spots, altered reaction to UV light, palmar erythema, Dupuytren's contracture, and clubbing. Widespread alterations in the circulatory system include changes in the hepatic and splanchnic vasculature, the systemic and pulmonary vasculature, and the heart. Functional renal failure is a frequent terminal event in chronic liver decompensation. It may occur abruptly or gradually, over weeks and months, and is characterized by ascites, edema, and signs of dehydration. Among the digestive organs, the parotid gland may be enlarged, accompanied by hypersecretion and a high rate of amylase production. The pancreas may have a high secretory volume, and maldigestion and malabsorption are not uncommon. Deficient absorption of lipid-soluble vitamins and of calcium occurs, and reduced basal gastric secretion has been observed. Peptic ulcer incidence is increased, and cholelithiasis is more common than in matched noncirrhotic patients. Abdominal hernia often precedes ascites. The most prominent alteration in bone is osteoporosis. Many endocrine disturbances are related to altered catabolism or inactivation of hormones. Gynecomastia, alteration of secondary hair distribution, loss of libido, impotence, and testicular atrophy are frequently encountered in men, and women frequently experience amenorrhea or dysmenorrhea, cystic mastitis, or acne. Sterility is almost universal. Adrenal dysfunction is suggested clinically, but the exact nature of this abnormality is not understood. Anemia, leukopenia, and thrombocytopenia are common. Hemorrhagic disorders occur in about 5%, and clotting factor deficiency is common. Cirrhotic patients are more susceptible to infection, particularly with gram-negative bacteria. Several types of neuropsychiatric syndromes, or portosystemic encephalopathy, have been described in association with the disease. Acute encephalopathy is reversible, but the chronic form is irreversible.

8311 PRIMARY BILIARY CIRRHOSIS. (Eng.) Schaffner, F. (No affiliation given). *Clin. Gastroenterol.* 4(2):351-366; 1975.

The etiology, pathology, clinical picture, diagnosis, immunological aspects, and treatment of primary biliary cirrhosis are reviewed. The disease most frequently affects middle-aged women and is associated with severe pruritis. Radiographically or upon direct cholangiography, the smaller intrahepatic ducts are diffusely or focally narrowed or shortened and show diminished branching. Serum alkaline phosphatase is consistently elevated, to as high as 25 times normal. Serum bile acids are also elevated, and they appear to be related to the pruritis. Serum proteins are frequently lower than normal, as is prealbumin and hemopexin. Complement-fixing circulating antibodies directed against ductal cell cytoplasm and antinuclear antibodies have been demonstrated, as well as antibodies directed against mitochondria. The latter are the basis of a diagnostic test for this disease. Considerable evidence has linked primary biliary cirrhosis to an altered cell-mediated immune response. This disease may also be associated with other diseases of altered immune responsiveness, e.g., scleroderma and Sjogren's syndrome, and, to a lesser extent, rheumatoid arthritis and lupus erythematosis. Intensive studies of the relation between primary biliary cirrhosis and hepatitis B have shown that hepatitis B plays no role in its etiology. The initial injury is to the small interlobular or septal bile ducts. As these are destroyed, bile ductules proliferate, only to be eventually destroyed too, with the production of scar tissue. This is followed by true cirrhosis. Bile duct destruction in the absence of advanced cirrhosis or chronic aggressive or even acute viral hepatitis is considered pathognomonic of primary biliary cirrhosis. Since the underlying etiologic agent is unknown, therapy has been empirical. Diet therapy for hypercholesterolemia has not been helpful, but a low cholesterol intake and the use of polyunsaturated fats are suggested. Cholestyramine, a bile acid-sequestering resin, and anabolic steroids have been useful in controlling pruritis. Bone problems can be minimized by parenteral vitamin D supplements. Corticoids and immunosuppressive therapy have not been helpful in controlling the underlying disease process.

8312 A STUDY OF THE ENDOCRINE MANIFESTATIONS OF HEPATIC CIRRHOSIS. (Eng.) Baker, H. W. G.; Burger, H. G.; de Kretser, D. M.; Dulmanis, A.; Hudson, B.; O'Connor, S.; Paulsen, C. A.; Purcell, N.; Rennie, G. C.; Seah, C. S.; Taft, H. P.; Wang, C. (Medical Res. Center, Prince Henry's Hosp., Melbourne, Australia). *Q. J. Med.* 45(177):145-178; 1976.

To test the hypothesis that the primary abnormality in cirrhosis is a reduction in the capacity of the liver to degrade estrogens, the clinical features and hormonal abnormalities of 117 cases of liver cirrhosis were surveyed. Compared with healthy men of similar ages, the patients had significantly lower mean metabolic clearance rates of testosterone (621 l/day versus 1,043 l/day, $p<0.001$), lower plasma production rates of testosterone (3.18 mg/day vs. 6.74 mg/day, $p<0.001$), lower total plasma testosterone levels (range=1.71-8.05 ng/ml versus 3.34-10.75, $p<0.001$), and lower mean free testosterone levels (31.0 pg/ml versus 98.4 pg/ml, $p<0.001$). In addition, the mean testosterone level rose only 40% in the cirrhotic patients after they received 1,500 U of human chorionic gonadotrophin twice daily for 4 days, whereas it rose 149% in the normal men ($p<0.001$). In comparison with the controls, the patients had higher estradiol levels (up to 103 pg/ml versus a maximum of 39 pg/ml, $p<0.001$), higher luteinizing hormone levels (0.5-14.3 mIU/ml versus 0.6-3.3 mIU/ml, $p<0.001$), higher follicle stimulating hormone levels (0.2-37.7 mIU/ml versus 0.5-8.0 mIU/ml, $p<0.01$), and higher binding capacities of sex steroid binding globulin (10.4×10^{-8} M versus 5.1×10^{-8} M). The peripheral conversion of testosterone to estradiol was also significantly increased in the cirrhotic patients. However, the metabolic clearance and plasma production rates of estradiol were not significantly different from those of healthy controls. Patients who were severely ill with liver failure and one patient with hemochromatosis had low levels of luteinizing hormone and follicle stimulating hormone and subnormal responses to clomiphene and luteinizing hormone-releasing hormone. Higher plasma estradiol levels were found in patients with gynecomastia and spider nevi than in those without these signs. The clinical features of androgen deficiency were only poorly related to the low testosterone levels, and production rates and longitudinal studies indicated that the hormonal levels, endocrine features, and severity of the liver disease could change independently. It is concluded that the clearance of estradiol from plasma is not limited by liver disease in all patients and that reduced degradation of estrogens is not the initial event in the sequence leading to the hormonal abnormalities of cirrhosis.

8313 HUMORAL IMMUNITY AND CELLULAR HYPERSENSITIVITY IN LIVER CIRRHOSIS. (Rus.) Makarevich, Ya. A.; Zaklyakova, L. V.; Afanasiev, S. S.; Zhabotinskaya, T. M. (Astrakhan Medical Inst., Astrakhan, USSR). *Sov. Med.* (5):99-103; 1975.

Humoral immunity and cellular hypersensitivity were studied in 30 patients with liver cirrhosis (21 cases of portal cirrhosis, 8 cases of postnecrotic cirrhosis, and 1 case of biliary cirrhosis). Patients with other diseases and healthy subjects served as controls. The lymphocyte blast transformation test revealed transformation of 50.7% of the lymphocytes sensitized to hepatic antigen; there was a spontaneous transformation rate of 19.6%, as opposed to less than 1% in the control. Rebuck's dermographic test revealed a highly significant increase in the percentage of cells of the reticulohistiocytic system. The leukocytolysis stimulation reaction was positive in moderately active cirrhosis and weakly positive in less active forms of the disease. Fleck's leukocyte agglomeration test was positive in moderately active forms of cirrhosis. The local hemolysis test was highly positive in cirrhosis of low activity. Humoral autoantibodies to hepatic antigen were found in 71.4% of the patients. There was no correlation between the incidence of titer of antibodies and the degree of the allergic cellular reactions. The results suggest that autoallergy in liver cirrhosis is of a mixed cellular-humoral nature, which is confirmed by experimental findings, including the transfer of allergy through the agency of blood cells and sera.

8314 RELATION OF STEATOSIS TO CIRRHOSIS. (Eng.) Thaler, H. (No affiliation given). *Clin. Gastroenterol.* 4(2):273-280; 1975.

The causes of steatosis of the liver, or fatty liver, and its possible relation to hepatic cirrhosis are discussed. In one series of 10,970 liver biopsies, the incidence of steatosis was 26.5%. In the overpopulated and underdeveloped countries of the tropics, steatosis of the liver from protein deficiency (kwashiorkor) is probably the most frequent type, but in North America and Europe, steatosis results most often from overnutrition. In biopsy material, alcoholism is the most frequent cause because biopsy is the only reliable method of ascertaining the degree of hepatic damage in this condition. Less frequent causes are hyperlipoproteinemia and drugs (e.g., tetracycline and corticoids). In 2%-3%, the cause is unknown. Hepatic steatosis disappears quickly and completely once the cause is removed. This is true in kwashiorkor as well as in alcoholism. Cirrhosis results from the cause of the steatosis, and not from the fat accumulation itself. There is no evidence in man that cirrhosis results from nutritional deficiencies alone. Even the cirrhosis that occurs after small bowel bypass operations appears to be the result of metabolic rather than nutritional disturbances.

8315 STUDIES ON LIVER CIRRHOSIS IN AOMORI PREFECTURE WITH SPECIAL REFERENCE TO EPIDEMIOLOGY. (Jpn.) Nara, H. (Hirosaki Univ. Sch. Medicine, Hirosaki, Japan). *Hirosaki Med. J.* 26(3/4): 417-426; 1974.

8316 SPONTANEOUS REVERSAL OF PORTAL FLOW IN CIRRHOSIS. ANGIOGRAPHIC STUDY OF 15 CASES. (Fre.) L'Hermine, C.; Paris, J. C.; Villoutreix, H.; Dehaene, J. L.; Lemaitre, G. (C.H.U., F 59000 Lille, France). *Radiol. Electrol.* 56(6/7):491-503; 1975.

8317 MEASUREMENT OF CORTISOL AND CORTICOSTEROID BINDING GLOBULIN IN NORMAL MEN AND WOMEN, PREGNANT WOMEN AND PATIENTS WITH LIVER CIRRHOSIS AND MALABSORPTION SYNDROME. (Spa.) Fanghanel, G.; Blitz, I. B.; Uribe, M.; Morato, T. (Instituto Nacional de la Nutricion, Mexico 22, D.F., Mexico). *Rev. Invest. Clin.* 28(2):151-159; 1976.

8318 IMPORTANCE OF LIVER-PANCREAS AXIS IN THE DETERMINISM OF REDUCED CARBOHYDRATE TOLERANCE IN CIRRHOTIC PATIENTS. (Ita.) Bonavita, M. S.; Balsano, F.; Lostia, O. (Cattedra di Semeiotica Medica VI dell 'Universita di Roma, Rome, Italy). *Prog. Med.* 31(24):1025-1029; 1975.

8319 EVALUATION OF THE BEHAVIOR OF CARBOHYDRATES AND OF IMMUNOREACTIVE INSULIN IN LIVER CIRRHOSIS. (Ita.) Savastano, A.; Rocca, F.; Lodi, G.; Gobbi, A. (Ospedale Generale Provinciale, Busto Arsizio, Italy). *Minerva Med.* 66(80):4235-4241; 1975.

8320 PHENYLALANINE METABOLISM IN PATIENTS WITH LIVER CIRRHOSIS. (Eng.) Rodjer, S.; Jagenburg, R.; Olsson, R. (Dept. Medicine II and Clinical Chemistry, Univ. Gothenburg, Sweden). *Scand. J. Clin. Lab. Invest.* 35(Suppl. 143):3; 1976.

8321 INVESTIGATIONS ON THE EFFECT OF ORALLY ADMINISTERED SOLCOSERYL ON HEPATIC METABOLISM IN CHRONIC LIVER DISEASE PATIENTS. (Ger.) Reikowski, J.; Muting, D. (Medizinische Universitats- und Poliklinik, D-6650 Homburg/Saar, W. Germany). *Wien. Med. Wochenschr.* 125(49):716-719; 1975.

8322 α-FETOPROTEIN IN INDIAN CHILDHOOD CIRRHOSIS [Letter to Editor]. (Eng.) Sehgol, S.; Walia, B. N. S. (Inst. Postgraduate Medical Education and Res., Punjab Univ., Chandigarh, India). *Lancet* 2(7945):1144-1145; 1975.

8323 CIRRHOTIC ASCITES: EXPERIENCE WITH AUTOGENEOUS ASCITIC FLUID INFUSION [Abstract]. (Eng.) Graziano, J. L.; Hacker, L. C.; Howell, S.; Reinhardt, G. F.; Stanley, M. M. (Veterans Admin. Hosp., Hines, IL). *Proc. Inst. Med. Chic.* 30:273; 1975.

8324 MASSIVE INTRAPERITONEAL HEMORRHAGE AND INTRAHEPATIC ARTERIOVENOUS FISTULA IN HEPATIC CIRRHOSIS. (Eng.) Doromal, N. M.; Middleton, P.; Keshishian, J. N. (Washington Hosp. Center, Washington, DC). *J. Med. Soc. N.J.* 72(10):830-832; 1975.

See also, 7961, 7962, 8204, 8205, 8245, 8272, 8305, 8363, 8364.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

8325 BILIARY LITHOGENESIS AND BILE ACID METABOLISM UNDER THE INFLUENCE OF β-SITOSTEROL. (Ger.) Begemann, F.; Bandomer, G.; Herget, H. J. (No affiliation given). *Z. Gastroenterol.* 14(Suppl.): 240; 1976.

The lithogenic effect of β-sitosterol, a phytosterol that inhibits intestinal cholesterol resorption without self-resorption, is explored. Administration of 12 g/day of β-sitosterol (SS) induced a 10-15% decrease in lithogenesis inside of 6 weeks in six of seven subjects. The average depression was 10% ($p<0.05$). The rate of primary bile acid synthesis, total enterohepatic bile acid pool, and its components (cholic, chenodeoxy, and deoxycholic acids) varied and could not be correlated with the diminished lithogenesis. The results demonstrate the importance of SS in dissolving cholesterol stones; however, the elevated cholesterol solubility of bile under SS cannot be explained by increased bile acid formation alone.

8326 PRIMARY SCLEROSING CHOLANGITIS. (Rus.) Potashov, L. V.; Krasnov, E. I. (I. P. Pavlov First Leningrad Medical Inst., Leningrad, USSR). *Klin. Med.* 54(2):139-141; 1976.

The clinical features and treatment of primary sclerosing cholangitis in a 36-yr-old woman are described. The patient presented with subicteric sclera, slight pain in the right hypochondrium and in the epigastric region, a high urinary bile pigment level, and bilirubinemia. Surgery, performed for suspected mechanical obstruction of the bile ducts, revealed sclerosis and occlusion of the common hepatic duct. Recanalization, drainage, cholecystostomy, and choledochostomy were performed. Adjuvant desensitizing and antiinflammatory therapy was also given. Practically complete recovery and reduction of bilirubinemia were achieved after protracted hepatobiliary insufficiency. The patient is in satisfactory condition 14 months after surgery.

8327 CAUSE OF DEATH OF PATIENTS WITH CHOLELITHIASIS NOT SUBJECTED TO SURGERY. (Rus.) Dmitriev, A. E.; Tatevosian, A. S.; Mezhenkov, E. P. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 53(11):69-73; 1975.

The causes of death for 65 patients with cholelithiasis who refused to undergo surgery or were not operated because of highly impaired health status or erroneous diagnosis were analyzed. There were 14 patients under 60 yr of age and 51 over 60. The causes of death were necrosis of the pancreas in 15 cases (1 patient under 60, 14 over 60), peritonitis in 13 (2 and 11, resp.); hepatorenal insufficiency in 12 (8 and 4, resp.); cholangitis in 8 (1 and 7, resp.); sepsis in 7 (2 and 5, resp.); and poisoning, pneumonia, thromboembolism of the pulmonary artery, and hemorrhagic infarction of the lung in 3, 4, 2, and 1 patient, resp., over 60 yr of age. The findings indicate that the necessity of early operation after the first attack of acute calculous cholecystitis and of emergency surgery for pyonecrotic processes in the gallbladder. Surgery is especially recommended for elderly and senile patients in whom destructive cholecystitis can bring about various types of pyoseptic complications in the biliary tract and cardiopulmonary tissue.

8328 SELECTION OF GALLSTONE PATIENTS FOR LITHOLYSIS. (Ger.) Wolpers, C. (Lubeck, W. Germany). *Leber Magen Darm* 6(1):43-46; 1976.

Factors in selecting gallstone patients for litholysis are reviewed and discussed. A retrospective survey of 825 cholecystectomized patients with stones illustrates the types of selection criteria for potential candidates. Contraindications, occurring in 628 patients, included cystic duct occlusion (198 cases), too large of a stone volume (151), single stones with diameters exceeding 20 mm (86), heavy calcium content (77), pigment stones (63), choledocholithiasis (37), partially cirrhotic bladder (10), and adenomyomatosis or polyps with stones (6). Indications, occurring in 197 patients, included single cholesterol stones with diameters 20 mm or less (50 patients) and multiple cholesterol stones of equal (99) or unequal (48) size. About 94% of human stones have predominantly cholesterol compositions; 6% are pigmented, two-thirds of which have elevated calcium carbonate deposition. If stone dimensions are below 15 mm, radiological differentiation of about 2% of the calcium-deficient pigment stones from about 70% of the multiple cholesterol stones is impossible. The suspension properties of stones in the contrast medium is often more decisive than size, shape, contour, specific weight, or radiolucency; fresh stones are suspended and pigment or old cholesterol stones are sedimented. Cholesterol stones also grow five times more rapidly than pigment stones. The age of a stone is roughly equivalent to its diameter. Both a patent cystic duct and adequate reaction space in the gallbladder are required for successful litholysis. Chenodeoxycholic acid is mentioned as the litholytic agent of choice.

8329 EARLY DIFFERENTIAL DIAGNOSIS OF JAUNDICE WITH THE AID OF RETROGRADE CHOLANGIOPANCREATOGRAPHY THROUGH A FIBERDUODENOSCOPE. (Rus.)

Panchenkov, R. T.; Semenov, V. V.; Stanulis, A. I.; Vasilyev, Yu. D. (N. A. Semashko Moscow Medical Inst. Stomatology, Moscow, USSR). *Klin. Med.* 54(2): 75-79; 1976.

The differential diagnosis of obstructive jaundice by retrograde cholangiopancreatography through a fiberduodenoscope was performed in 55 adults with various diseases of the liver, bile ducts, and pancreas, complicated by obstructive jaundice. The cholangiopancreatographic differential diagnosis of obstructive jaundice was successful in 41 cases. Diagnosis was possible by duodenoscopy and spot biopsy from the region of the ampulla of Vater in 12 cases of inflammation of the ampulla of Vater. The examination failed in two cases. Chronic calculous cholecystitis with choledocholithiasis was diagnosed by retrograde cholangiopancreatography in 11 cases, choledocholithiasis in 17, stenosis of the choledochoduodenal anastomosis in 1, chronic recurrent pancreatitis in 5, and cicatricial stricture of the common bile duct in 7. Forty-four patients underwent surgery and three, laparoscopy. Intraoperative cholangiography, choledochoscopy, laparotomy, and autopsy fully confirmed the retrograde cholangiopancreatographic diagnosis of obstructive jaundice. No complications were observed during or after the procedure.

8330 SURGICAL MANAGEMENT OF HIGH OBSTRUCTION OF THE BILIARY TRACT. (Rus.)

Artem'eva, N. N. (Leningrad Inst. Hygiene and Medicine, Leningrad, USSR). *Khirurgiia (Mosk.)* (11):98-103; 1975.

One hundred twenty-eight operations were performed in 114 patients for high obstruction of the biliary tract. The obstruction was due to cicatricial stricture of the hepatic bile duct in 32 cases, to cancer of the gallbladder in 44, to cancer of the hepatic bile duct in 28, to cancer metastasis to the lymph nodes of the hepatoduodenal ligament in 8, and to benign tumors of the hepatic bile duct in 2. The surgical method was selected as a function of cholangiographic findings and the stage of jaundice. The stump of the hepatic duct was anastomosed with the duodenum in a Y-shaped drainage (8 operations), or with a Y-shaped excluded jejunal loop (16 operations) in some of the patients with cicatricial stricture. The lobular ducts were anastomosed with the jejunum on a Y-shaped drainage in five cases, cholangiohepatogastrostomy was performed in three cases, and subcutaneous fistuloenterostomy with a Y-shaped excluded intestinal loop was performed in six. Six patients died following surgery. Among the 82 tumor patients, radical surgery (resection of the hepatic duct or cholecystectomy with resection of the bile duct or of the liver and bile duct) was performed in four cases, while the surgery on the hepatic and extrahepatic bile ducts was palliative in all other cases. The postoperative mortality was 22 patients, the average survival was 8 months. In patients with cicatricial stricture, the best results were obtained with anastomosis between the extrahepatic bile ducts and a Y-shaped excluded intestinal loop. If the ducts of the right and left hepatic lobes were communicating, there was sufficient drainage of the ducts of one lobe only. Otherwise, both lobes had to be drained.

8331 METHOD AND DIAGNOSTIC POTENTIAL OF PERITONEOSCOPIC GALLBLADDER PUNCTURE. (Ger.)

Ropertz, S.; Wagner, K. (Krankenhaus St. Rochusstift, Bad Mergnetheim, W. Germany). *Leber Magen Darm* 6(1):19-24; 1976.

Experiences with diagnostic peritoneoscopic gallbladder puncture are described. Only one complication, a local peritonitis, occurred among 110 puncture procedures. The site of choice for puncture is either the medial part of the middle of the gallbladder or the cranial half of the body. The flexible needle, 15 cm in length with an external diameter of 0.8 mm and internal diameter of 0.5 mm, can be use for bile aspiration or transvesicular cholecystocholangiography. The majority of positive transvesicular visualization of stones was negative in conventional radiology; one radiological picture was too equivocal for interpretation, and cholecystolithiasis had already been diagnosed in two others. In the punctur sample, conventional radiology was positive in 14 cases of gallstones: 3 with ductal stones, 7 with combined bladder-duct lithiasis, 4 each with various bladder and ductal modifications, and cases of biliar infections, with or without lithiasis. Indications for peritoneoscopic puncture with cholecystocholangiography include iterus of nuclear origin, negative cholecystograms, dyskinetic bladder, occult pain without radiological correlation, and recent inflammation or serous changes.

8332 GOBLET CELLS, ENTEROCHROMAFFIN CELLS, SUPERFICIAL GASTRIC-TYPE EPITHELIUM AND ANTRAL-TYPE GLANDS IN THE GALLBLADDER. (Eng.)

Laitio, M. (Dept. Pathological Anatomy, Central Hosp. Seinajoki, Seinajoki, Finland). *Beitr. Pathol.* 156(4): 343-358; 1975.

8333 COMPLEX THERAPY FOR ACUTE INFLAMMATIONS OF THE BILIARY TRACT. (Rus.)

Yubensky, Yu. M. (Surgery Clinic, Krasnoiarsk Medical Inst., Krasnoiarsk, USSR). *Khirurgiia* 10:34-36; 1975.

8334 ULTRASONIC AND RADIOGRAPHIC CHOLECYSTOGRAPHY: A COMPARISON. (Eng.)

Goldberg, B. B.; Harris, K.; Broocker, W. (Episcopal Hosp., Front St. and Lehigh Ave., Philadelphia, PA). *Radiology* 111(2):405-409; 1974.

8335 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. (Eng.) Amla, T. R.; Khan, M.; Ahmad, S. Z. (Radiology Dept., Govt. Medical Coll., Jammu, India). *Indian J. Radiol.* 28(3):166-169; 1974.

8336 HYPERTHYROIDISM AFTER CHOLECYSTOGRAPHY. (Eng.) Fairhurst, B. J.; Naqvi, N. (Royal Albert Edward Infirmary, Wigan, England). *Br. Med. J.* 3(5984):630; 1975.

8337 UNUSUAL RADIOGRAPHIC MANIFESTATIONS OF ADENOMYOMATOSIS OF THE GALLBLADDER. (Eng.) Cynn, W.-S.; Forbes, T.; Schreiber, M. (Graduate Hosp., Univ. Pennsylvania, Philadelphia, PA 19146). *Radiology* 113(3):577-579; 1974.

8338 ACUTE ABDOMEN DUE TO ACUTE CHOLANGITIS IN A LEUKEMIC CHILD. (Eng.) Kosloske, A. M.; Zwartjes, W. J. (Denver Children's Hosp., Denver, CO). *Pediatrics* 56(3):469-471; 1975.

8339 THE CHOLECYSTOCORONARY SYNDROME. (Rus.) Shalaev, M. I.; Rekhachev, V. P.; Petrichenko, A. I.; Belyaevsky, E. G. (Surgical Clinic, Arkhangelsk Medical Inst., Arkhangelsk, USSR). *Khirurgiia* (10):45-47; 1975.

8340 ACUTE CHOLECYSTITIS. (Eng.) Raine, P. A. M.; Gunn, A. A. (Bangour General Hosp., West Lothian, ME). *Br. J. Surg.* 62(9):697-700; 1975.

8341 COMBINED EMPLOYMENT OF CHOLEDOCHODUODENOSTOMY AND SPHINCTEROTOMY. (Rus.) Milonov, O. B.; Movchun, A. A. (Dept. Hepatobiliary Surgery, All-Union Scientific Res. Inst. Clinical and Experimental Surgery, Moscow, USSR). *Khirurgiia* 10:18-25; 1975.

8342 GALL-STONES: GEOGRAPHICAL AND CHRONOLOGICAL FEATURES. (Eng.) Burkett, D. P.; Tunstall, M. (No affiliation given). *J. Trop. Med. Hyg.* 78(6):140-144; 1975.

8343 BILE LIPID COMPOSITION IN POPULATIONS WITH HIGH RISK OF GALL-STONES [Abstract]. (Eng.) Ponz de Leon, J.; Mauro, E.; Carulli, N. (Istituto di Clinica Medica dell'Universita, Modena, Italy). *Rend. Gastroenterol.* 7(3):236; 1975.

8344 THE ROLE OF INTESTINAL MALABSORPTION OF BILE ACIDS IN THE PATHOGENESIS OF CHOLESTEROL GALLSTONES [Abstract]. (Eng.) Barbara, L.; Roda, E.; Roda, A.; Festi, D.; Sama, C.; Mazzella, G.; Aldini, R. (Facolta di Farmacia dell'Universita, Bologna, Italy). *Rend. Gastroenterol.* 7(3):236-237; 1975.

8345 TREATMENT OF CHOLESTEROL GALLSTONES WITH CHENODEOXYCHOLIC ACID AND ITS EFFECT ON BILE LIPID COMPOSITION [Abstract]. (Eng.) Roda, E.; Roda, A.; Sama, C.; Festi, D.; Mazzella, G.; Aldini, R.; Barbara, L. (Facolta di Farmacia dell' Universita, Bologna, Italy). *Rend. Gastroenterol.* 7(3):237-238; 1975.

8346 MEDICAL TREATMENT OF GALLSTONES. (Eng.) Watts, J. McK.; Jablonski, P.; Toouli, J. (Prince Henry's Hosp., Victoria 3004, Australia). *Drugs* 10(5/6):342-350; 1975.

8347 ENDOSCOPIC PAPILLOTOMY AND REMOVAL OF GALL STONES. (Eng.) Classen, M.; Safrany, L. (I Medical Dept., Allgemeines Krankenhaus, Barmbek, Hamburg, W. Germany). *Br. Med. J.* 4(5993):371-374; 1975.

8348 THE GLUCOCORTICOID FUNCTION OF THE ADRENAL CORTEX IN PATIENTS WITH COMPLICATED FORMS OF CHOLELITHIASIS. (Rus.) Maloman, E. N.; Stavinskii, R. A. (Surgical Clinic, Kishinev Medical Inst., Kishinev, USSR). *Khirurgiia* (10):100-106; 1975.

8349 BILE ACIDS IN THE SERUM AND URINE OF PATIENTS WITH CHOLESTASIS. (Ita.) Salvioli, G.; Salati, R.; Lugli, R.; Baldelli, M. V. (Istituto di Clinica Medica Generale, Universita di Modena, Modena, Italy). *Fegato* 20(4):387-402; 1974.

8350 A RANDOMIZED TRIAL OF PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY VERSUS ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY FOR BILE DUCT VISUALIZATION IN CHOLESTASIS [Abstract]. (Eng.) Elias, E.; Hamlyn, A. N.; Jain, S.; Long, R.; Summerfield, J. A.; Dick, R.; Sherlock, S. (Royal Free Hosp., London, England). *Br. Soc. Gastroenterol.* 16(10):831; 1975.

8351 CONTRIBUTION OF MORPHOMETRY TO THE STUDY OF CHOLESTASIS IN MAN [Abstract]. (Eng.) Capurso, L.; Koch, M.; Freddara, U.; Lorenzini, I.; Jezequel, A. M.; Orlandi, F. (Digestive Diseases and Cell Pharmacology Units, Univ. Ancona, Ancona, Italy). *Digestion* 12(4/6):294; 1975.

8352 HEMATOBILIA. (Ger.) Safrany, L.; Schonleben, K.; Wittrin, G.; Rudiger, E. (Chirurgische Klinik mit Poliklinik der Universitat, D-4400 Munster, Junseboldtplatz 1, W. Germany). *Leber Magen Darm* 5(5):229-234; 1975.

8353 JAUNDICE AS A SIGN OF DELAYED GALL-BLADDER PERFORATION FOLLOWING BLUNT ABDOMINAL TRAUMA. (Eng.) Fielding, J. W. L.; Strachan, C. J. L.

(Dudley Road Hosp., Birmingham, England). *Injury* 7(1):66-67; 1975.

8354 AN ELECTRON MICROSCOPIC STUDY OF INTESTINAL METAPLASIA IN HUMAN GALLBLADDER. (Eng.) Laitio, M.; Nevalainen, T. J. (Dept. Pathological Anatomy, Central Hosp. Seinajoki, 60100 Seinajoki, Finland). *Beitr. Pathol.* 155(3):297-308; 1975.

8355 THE WANDERING GALLBLADDER. (Eng.) Chiavarini, R. L.; Chang, S. F.; Westerfield, J. D. (Univ. Michigan Medical Center, Ann Arbor, MI 48104). *Radiology* 115:47-48; 1975.

8356 UNEXPECTED CAUSE OF PROLONGED EVALUATION OF ALKALINE SERUM PHOSPHATASE POSTOPERATIVELY AFTER LIVER INJURY [Abstract]. (Eng.) Klein, U. E.; Lehmann, H.; Schlaak, M. (I. Medical Clinic, Univ. Kiel, Kiel, W. Germany). *Digestion* 12(4/6): 319; 1975.

See also, 7772, 7802, 7902, 7921, 7922, 7953, 7954, 7955, 7956, 7957, 7958, 8059, 8139, 8202, 8229, 8366, 8397, 8421.

GENERAL

8357 LONG-TERM OBSERVATIONS IN ENDOSCOPIC LASER COAGULATIONS IN THE GASTROINTESTINAL TRACT. (Eng.) Fruhmorgen, P.; Kaduk, B.; Reidenbach, H.-D.; Bodem, F.; Demling, L.; Brand, H. (Med. Univ.-Klinik, D-852 Erlangen, Krankenhausstr. 12, W. Germany). *Endoscopy* 7(4):189-196; 1975.

Long-term studies were carried out in dogs to determine whether late morphological changes follow light coagulations with the argon laser in the gastrointestinal tract. One hundred sixteen lesions were created in the esophagus, stomach, and small and large intestine. The coagulations were performed through a fiberendoscope, and a flexible plastic light guide was used. Neither peritonitis nor death due to perforation occurred in any of the animals. Nineteen lesions were examined endoscopically at 6, 12, 18, 24, 35, and 41 days after coagulation; all but a single lesion had healed by the 12th day. The remaining 45 lesions were examined histologically after 24 hr, 14 days, and 21 days. At 24 hr, the epithelium of the lesions in all areas of the gastrointestinal tract was eroded and ulcerated. In the margins of necrotic areas, there was WBC infiltration. The lumen of the submucosal vessels was thrombotic. After 14 days, scarring with incipient epithelialization and the formation of capillaries in granulation tissue was seen. After 21 days, re-epithelialization was well advanced or complete in all lesions. Light coagulation has the following advantages over electrocoagulation in the treatment of patients: no direct contact with the tissue, and thus no sticking of the probe tip to the coagulated tissue, the ability to control the procedure visually, no flow of current through the body tissues, greater therapeutic range, selective absorption, autoregulation of the depth of penetration, rapid and effective coagulation, and less blood loss.

8358 INVOLVEMENT OF THE SMALL INTESTINE IN SYSTEMIC MAST CELL DISEASE. (Eng.) Scott, B. B.; Hardy, G. J.; Losowsky, M. S. (St. James's Hosp., Leeds, England). *Gut* 16(11):918-924; 1975.

The case of a patient with mast cell infiltration of the small intestine in the absence of the skin involvement characteristic of mast cell disease is presented. The results of quantitative studies of the mast cells in the small bowel mucosa of 11 patients with untreated celiac disease and 10 controls are also reported. The patient, a 47-yr-old woman, had a 10-yr history of intermittent abdominal pain and diarrhea. Other clinical features that supported the diagnosis of mast cell disease were: histaminuria; increased urinary heparinoids; episodes of facial flushing; increased numbers of mast cells in the small bowel mucosa; and subtotal villous atrophy, responsive to a gluten-free diet. She had persistent malabsorption, the fecal fat levels ranging between 42 and 53 mmol/24 hr. Other features of celiac disease were raised levels of gluten antibodies and the presence of histocompatibility antigen HL-A8. There was no skin involvement, and a skin biopsy showed no excess of mast cells. The patient responded to treatment with propantheline, antihistamines, analgesics, and hyoscine. Jejunal biopsies from the patients with untreated celiac disease and from the controls revealed that the average number of mast cells in the lamina propria of both groups was two per high-power field (HPF). Because previous studies have shown that the finding of a level of more than six mast cells per HPF in the skin is suggestive of mast cell disease, the authors propose that the presence of more than this number of mast cells in the lamina propria is suggestive of mast cell disease.

8359 LOPERAMIDE IN CHRONIC DIARRHEA AND AFTER ILEOSTOMY: A PLACEBO-CONTROLLED DOUBLE-BLIND CROSS-OVER STUDY. (Eng.) Tytgat, G. N.; Huibregtse, K.; Meuwissen, S. G. M. (Div. Gastroenterology, Univ. Amsterdam, Amsterdam, Netherlands). *Arch. Chir. Neerl.* 28(1):13-20; 1976.

The effectiveness of loperamide in the treatment of diarrhea of various etiologies was tested in a double-blind study of 15 patients with diarrhea and 20 patients with well-established ileostomies. Loperamide, at a median dose of six (range 2-7) 2-mg capsules per day, was successful in controlling diarrhea in 11 of the 15 patients with chronic diarrhea; the 11 patients included 2 patients with ulcerative colitis, 1 patient with Crohn's disease of the colon, 5 patients with irritable colon, 1 patient with postvagotomy diarrhea, 1 patient who had undergone proctocolectomy, and 1 patient who had undergone colectomy and had proctitis. This treatment failed in one patient who had taken large amounts of laxatives, in two patients with severe cholerrheic diarrhea due to ileotransversostomy with bypass of the terminal ileum and right colon, and in one patient with diarrhea of unknown etiology. In the successfully treated patients, a statistically significant amelioration of stool consistency ($p<0.05$) and stool frequency ($p<0.01$) and a trend towards a lessening of abdominal cramps ($p<0.10$) was found. In the ileostomy patients, the median (and range) of daily fecal weight were 645 (100-2,620), 500 (80-2,010), and 660 (180-2,020) g, during the drug-free, loperamide, and placebo periods, resp., of the study. Daily fecal outputs were significantly lower during treatment with loperamide than during either the drug-free or placebo treatment ($p<0.001$). The median daily ileostomy output decreased by 22% during treatment with loperamide. Many ileostomy patients noticed an increased urinary production and experienced an improvement in ileostomy care during loperamide treatment. The results suggest that loperamide is useful and safe for the treatment of chronic diarrhea and in the treatment of ileostomy patients.

8360 ROLE OF PLASMA FILTRATION IN THE INTESTINAL FLUID SECRETION MEDIATED BY INFECTION WITH Salmonella typhimurium. (Eng.) Giannella, R. A.; Rout, W. R.; Formal, S. B.; Collins, H. (Dept. Gastroenterology, Veterans Admin. Hosp., Lexington, KY 40506). *Infect. Immun.* 13(2):470-474; 1976.

To study the mechanism of intestinal fluid secretion elicited by invasive bacteria, the plasma-to-lumen clearance of two different-sized molecules, ^{54}Cr-albumin and ^{14}C-mannitol, was measured in the *in vivo* rabbit ileal loop and *in vivo* rhesus monkey models of salmonellosis. The electrolyte and protein concentration of rabbit ileal fluid evoked by *Salmonella typhimurium* was measured and compared to cholera toxin- and cholera toxin-EDTA-mediated ileal fluids. In the rabbit ileal loop model, the clearance of neither molecule was increased when compared to cholera toxin-exposed loops. In the monkey, clearance of ^{14}C-mannitol into the jejunum, ileum, and colon did not differ from that observed in control animals. These data indicate that *S. typhimurium* did not alter the permeability characteristics of the intestinal mucosa substantially and that plasma filtration through a damaged, more-permeable mucosa does not contribute to the *Salmonella*-induced intestinal secretory process.

8361 SURGICAL APPROACH TO NUTRITIONAL PROBLEMS. (Eng.) Jordan, G. L., Jr. (Baylor Coll. Medicine, Houston, TX). *Adv. Surg.* 8:85-128; 1974.

8362 PATHOGENESIS AND FREQUENCY OF ESSENTIAL FATTY ACID DEFICIENCY DURING TOTAL PARENTERAL NUTRITION. (Eng.) Connor, W. E. (Univ. Oregon Health Sciences Center, Portland, OR). *Ann. Intern. Med.* 83(6):895-896; 1975.

8363 ALKALINE PHOSPHATASE IN HUMAN FECES, INTESTINAL MUCOSA AND BILE, AND THE OCCURRENCE OF 5'-NUCLEOTIDASE IN FECES. (Ger.) Benic, V.; Fiser-Herman, M. (Klinika za zarazne bolesti, 41000 Zagreb, Mirogojska 8, Yugoslavia). *Z. Klin. Chem. Klin. Biochem.* 13(10):437-444; 1975.

8364 THE ARTIFICIAL LIVER: CLINICAL AND EXPERIMENTAL STUDIES. (Eng.) Williams, R. (King's Coll. Hosp. Medical Sch., Denmark Hill, London SE5 8RX, England). *Rend. Gastroenterol.* 7(3): 197-204; 1975.

8365 DRUGS IN GASTROINTESTINAL DISEASES. (Eng.) Levitan, R. (Veterans Admin. West Side Hosp., Chicago, IL). *Ill. Med. J.* 147(1):83-86; 1975.

8366 THE EFFECT OF CALCIUM ON PLASMA LIPIDS AND BILE ACID AND FECAL FAT EXCRETION IN NORMOLIPIDEMIC SUBJECTS. (Eng.) Nazir, D. J.; Mishkel, M. A. (Hamilton General Hosp., Barton St. E., Hamilton, Ontario L8L 2X2, Canada). *Clin. Chim. Acta* 62(1):117-123; 1975.

8367 EFFECT OF TREATMENT WITH A BILE-SEQUESTERING AGENT (SECHOLEX®) ON INTESTINAL ABSORPTION, DUODENAL BILE ACIDS, AND PLASMA LIPIDS. (Eng.) Ritland, S.; Fausa, O.; Gjone, E.; Blomhoff, J. P.; Skrede, S.; Lanner, A. (Natl. Hosp. Norway, Oslo 1, Norway). *Scand. J. Gastroenterol.* 10(8): 791-800; 1975.

8368 CLINICAL EFFECTIVENESS OF INTRAVENOUS DOXYCYCLINE: TREATMENT AND PREVENTION OF SURGICAL INFECTIONS OF THE GASTROINTESTINAL TRACT. (Eng.) Marks, G.; Rodgers, J. F.; Moses, M. L. (Jefferson Medical Coll., Thomas Jefferson Univ., Philadelphia PA). *Curr. Ther. Res.* 18(3):460-465; 1975.

8369 DESFERRIOXAMINE B: REVERSIBLE SIDE EFFECTS OF HIGH DAILY DOSES. (Eng.) Cartei, G.; Barbui, T.; Cazzavillan, M.; Chisesi, T.; Dini, E. (Regional Civil Hosp., 31600 Vicenza, Italy). *Blut* 31(1):11-16; 1975.

8370 MASSIVE DEPOSITION OF MINERAL OIL AFTER PROLONGED INGESTION. (Eng.) Nochomovitz, L. E.; Uys, C. J.; Epstein, S. (Univ. Cape Town Medical Sch., Observatory, 7900, S. Africa). *S. Afr. Med. J.* 49(53):2187-2190; 1975.

8371 ALPHA HEAVY CHAIN DISEASE. (Eng.) Seligmann, M. (INSERM U-108, Hopital Saint Louis 2, place der Dr. Fournier, 75475 Paris Cedex 10, France). *Blut* 31(1):1-4; 1975.

8372 SEVERE IRON DEFICIENCY ANEMIA FROM INTESTINAL BLOOD LOSS IN CONNATAL BLIND LOOP SYNDROME. (Eng.) Sternowsky, H. J.; Kaufmann-Mackh, G. (Universitatskinderklinik, 2000 Hamburg 20, Martinstrasse 52, W. Germany). *Z. Kinderchir.* 17(1):29-34; 1975.

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See also, 7730, 7753, 7872, 7894, 7918, 7928, 7929, 7964, 7982, 7995, 8007, 8109, 8111, 8116, 8128, 8142, 8146, 8200, 8236, 8365.

GENERAL

Parasitology

8401 TREATMENT OF AMOEBIC RECTOCOLITIS: COMPARISON OF THE EFFICACY OF TINIDAZOLE AND METRONIDAZOLE WITH HIGH DOSAGE OVER A SHORT TERM. (Eng.) Manrique, E. C.; Gallegos, G. L.; Verdin, F.; Montero, S. (Hosp. General del Centro Medico Nacional IMSS, Mexico City, Mexico). *J. Int. Med. Res.* 3(5):314-318; 1975.

The therapeutic value of tinidazole was compared with that of metronidazole (both at 2.4 g/day, p.o., 2 days) in 20 patients with amebic rectocolitis. In the 10 patients treated with tinidazole, the symptoms of dysentery disappeared after 4 days. Side-effects (headache and tympanites) occurred in two patients treated with tinidazole. After 6 days, rectoscopy showed superficial lesions in two patients, and one of these patients also had ulcers. The rectal mucosa was normal in all 10 patients treated with tinidazole after 11 days. Colonoscopy on the third day revealed nonulcerated superficial lesions in one of three patients; colonoscopy on the 10th day showed no lesions in three patients, and colonoscopy on the 21st day showed a normal mucosa in all of four patients. Of the 10 patients treated with metronidazole, one patient had persistent dysentery. Two patients experienced dizziness and headache. Six days following the initial treatment, rectoscopy showed a normal mucosa in four patients, nonulcerated superficial lesions in one, and ulceration in five. After 11 days, only one patient still had mucosal lesions. This patient died due to the severity of the amebic disease, anemia, diabetes, cerebral vascular accident, and disseminated intravascular coagulation. Colonoscopy on the 10th day showed an abnormal mucosa in two of three patients. After 3 weeks, only one of four patients had an abnormal colonic mucosa. Laboratory tests were performed in 19 patients. All had normal liver function. Of the seven patients who had an abnormal blood count before treatment, the blood count returned to normal after treatment in five. On the 51st day after treatment, three papients who had received metronidazole and two patients who had received tinidazole continued to emit *Entamoeba histolytica* cysts. The results demonstrate that the therapeutic efficacy of both drugs was similar at equal doses, but tinidazole caused a more rapid healing of colonic lesions caused by the vegetative forms of the parasite.

8402 COMPARATIVE SENSITIVITY AND SPECIFICITY OF THE CASONI INTRADERMAL AND THE IMMUNOELECTROPHORESIS TESTS FOR THE DIAGNOSIS OF HYDATID DISEASE. (Eng.) Yarzabal, L. A.; Schantz, P. M.; Lopez-Lemes, M. H. (Service d'Immunologie et de Biologie Parasitaire, Place de Yerdun, 5900-Lille, France). *Am. J. Trop. Med. Hyg.* 24(5):843-848; 1975.

The sensitivity of the immunoelectrophoresis (IEP) test in the diagnosis of hydatid disease was compared with that of the Casoni intradermal (ID) test in 47 patients with surgically confirmed hydatid disease and 73 controls. When an antigen prepared from whole bovine hydatid fluid was used in the ID test, the reaction was positive in only 32 patients, whereas the ID test was positive in 38 patients when an antigen prepared from boiled hydatid fluid was used. The IEP test was positive in 37 of the 47 patients. Regardless of cyst localization, the lowest diagnostic sensitivity was observed in patients whose cysts were intact and of the hyaline type, whereas recently broken cysts were associated with the most consistently detectable immune response. Five patients were negative to both the IEP and ID tests. Comparing the IEP test and the ID test (using the boiled antigen), 33 patients were positive in both tests; 5 patients were positive in the ID test and negative in the IEP test, and 4 were positive in the IEP test and negative in the ID test. Of the 30 controls who had other diseases, 3 gave positive reactions with both antigens in the ID test, whereas none of the 43 normal controls gave a false-positive result. One patient with hydatid cyst developed an allergic reaction 20 min after inoculation with both antigen solutions in the ID test. Until more specific antigens are available, there appears to be little value in using the ID test when the more specific serological techniques are available.

8403 SEROLOGIC EVIDENCE OF THE POSTOPERATIVE PERSISTENCE OF HYDATID CYSTS IN MAN. (Eng.) Matossian, R. M.; Araj, G. F. (Dept. Bacteriology, Virology, American Univ. Beirut, Beirut, Lebanon). *J. Hyg. (Camb.)* 75(3):333-340; 1975.

The sensitivity of the hemagglutination (HA), complement fixation (CF), and indirect fluorescent antibody (IFA) tests in the diagnosis of primary and recurrent hydatid disease was studied in 80 patients with primary hydatid cysts, 62 patients previously operated upon for hydatid cysts (32 with no present cysts, 30 with recurrent disease), and 100 control subjects without hydatid disease. Among 50 healthy controls, all tests were negative; in the remaining 50 controls having other diseases, the HA, CF, and IFA tests were positive in 0%, 6%, and 12%, resp. The percentages of positive HA, CF, and IFA tests among 50 patients with primary hepatic hydatid cysts were 90, 80, and 96%, resp. Among 25 patients with primary pulmonary hydatid cysts, the percentages were 64, 60, and 68%, resp. Among the five primary hydatid cyst patients whose cysts occurred in other organs, the results were positive in all three tests in all cases. In the 32 patients with previous, but not recurrent disease, the HA, CF, and IFA tests were positive in 29%, 6%, and 28%, resp., suggesting that in postoperative patients, a negative CF test may indicate a better prognosis than the HA and IFA tests. In the 30 patients with recurrent disease, the percentages of positive reactions in the HA, CF, and IFA tests were 100, 97, and 100%, resp. The results indicate that by the simultaneous use of the HA and CF tests, it is possible to appraise the antibody globulin pattern of most patients with hydatid disease and thus establish a presumptive diagnosis or prognosis of the condition. IFA tests were not as useful in establishing the diagnosis and prognosis as originally expected.

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8405 CLINICAL EVALUATION OF TINIDAZOLE IN AMOEBIASIS IN CHILDREN. (Eng.) Ahmed, T.; Ali, F.; Sarwar, S. G. (Children's Hosp., Dacca, Box No. 303, Bangladesh). *Arch. Dis. Child.* 51(5):388-389; 1976.

8406 STUDY OF HELMINTHIASIS IN CHILDREN AND EVALUATION OF TETRAMISOLE IN ASCARIASIS. (Eng.) Narmada, R.; Athinarayanan, D.; Raju, V. B. (Inst. Child Health Hosp. Children, Madras-600008, India). *Indian Pediatr.* 12(8):685-688; 1975.

8407 COMPARISON OF PYRANTEL AND TETRAMISOLE IN ASCARIASIS. (Eng.) Sood, S.; Kini, A. S.; Master, J. (B. J. Wadia Hosp. Children, Bombay-400012 India). *Indian Pediatr.* 12(8):689-692; 1975.

8408 Clonorchis sinensis AND PANCREATITIS. TWENTY-FIVE YEARS AFTER ENDEMIC EXPOSURE. (Eng.) Shugar, R. A.; Ryan, J. J. (St. Vincent's Hosp., New York). *Am. J. Gastroenterol.* 64(5):400-403; 1975.

8409 ALGORITHMS IN THE DIAGNOSIS AND MANAGEMENT OF EXOTIC DISEASES. X. ECHINOCOCCOSIS. (Eng.) Grove, D. I.; Warren, K. S.; Mahmoud, A. A. F. (Dept. Medicine, Case Western Reserve Univ., Cleveland, OH). *J. Infect. Dis.* 133(3):354-358; 1976.

8410 Fasciola hepatica: STEREOLOGICAL ANALYSIS OF EFFECTS OF CERTAIN METABOLIC INHIBITORS ON SYNTHESIS OF SECRETORY BODIES BY THE TEGUMENT OF TISSUE SLICES. (Eng.) Hanna, R. E. B.; Threadgold, L. T. (Zoology Dept., Imperial Coll., London, England). *Exp. Parasitol.* 39(1):106-114; 1976.

8411 RESISTANT GIARDIASIS SECONDARY TO DUODENAL DIVERTICULA: CASE REPORT. (Eng.) Blechman, M. G.; Leibowitz, A. (Hackensack Hosp., Hackensack, NJ). *Am. J. Gastroenterol.* 64(5):407-409; 1975.

8412 COLORECTAL SCHISTOSOMIASIS: REPORT OF THREE CASES. (Eng.) Moss, C. M.; Carnevale, N.; Stern, W.; Li, J. (Montefiore Hosp., and Medical Center, Montefiore-Morrisania Affiliate, Bronx, New York). *Dis. Colon Rectum* 19(2):162-166; 1976.

8413 LETHALITY OF DISRUPTED INTESTINAL LAMINA PROPRIA CELLS FOR Trichinella spiralis IN VITRO. (Eng.) Castro, G. A.; Ray, S. A.; Schanbacher, L. M. (Univ. Texas Medical Sch., Houston, TX). *J. Parasitol.* 61(6):1053-1960; 1975.

See also, 7916, 7917, 8141.

GENERAL

Regional Enteritis

8414 ENDOSCOPIC FEATURES OF GASTRODUODENAL CROHN'S DISEASE. (Eng.) Danzi, J. T.; Farmer, R. G.; Sullivan, B. H., Jr.; Rankin, G. B. (Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, OH 44106). *Gastroenterology* 70(1):9-13; 1976.

The clinical, roentgenographic, and endoscopic findings in 14 patients with Crohn's disease of the stomach and/or duodenum are described. Three patients had ileal and gastroduodenal Crohn's disease; nine had ileal, colonic, and gastroduodenal Crohn's disease; and two patients had only gastroduodenal Crohn's disease. The mode of clinical presentation included upper gastrointestinal tract obstruction symptoms (7 patients), epigastric pain (6 patients), and occult upper gastrointestinal bleeding (1 patient). There was good documentation of the roentgenographically observed mucosal nodularity, antral narrowing, duodenal strictures, and thickened antral folds by endoscopy. Endoscopy revealed mucosal nodularity in 13 of 14 patients, multiple aphthous-like ulcerations in 9 of 14 patients, and linear or serpiginous ulcerations in 5 of the 9 patients with aphthous-like ulceration. Other endoscopic features included thickening of the antral folds in 7 of 11 patients with gastric disease, antral narrowing in 3 of 7 patients with gastric and duodenal disease, and duodenal stricture in 5 of 10 patients with duodenal disease. Endoscopic biopsy showed granulomatous inflammation in two of nine cases and chronic inflammation without evidence of noncaseating granuloma in seven cases. The diagnosis of Crohn's disease can be achieved by combining clinical, roentgenographic, and endoscopic features.

8415 CROHN'S DISEASE OF THE COLON. V. RETROPERITONEAL LUMBOCRURAL ABSCESS IN CROHN'S DISEASE INVOLVING THE COLON. (Eng.) Greenstein, A. J.; Dreiling, D. A.; Aufses, A. H., Jr. (Dept. Surgery, Mount Sinai Sch. Medicine, City Univ. New York, 100th St. and Fifth Ave., New York, NY 10029). *Am. J. Gastroenterol.* 64(4):306-318; 1975.

Of 231 patients with Crohn's colitis or ileocolitis, 12 (aged 11-36 yr), all within the group of 175 ileocolitis patients, developed a retroperitoneal lumbocrural abscess. At least 4 abscesses originated in the fistulous tracts of the colon, and 11 developed spontaneously as the first major complication of ileocolitis. The incidence of diarrhea, pain, weight loss, and toxemia did not differ significantly from the 219 remaining patients (controls). There was a significant difference ($p<0.005$) in clinical features: thigh pain, hip flexion, hydronephrosis and hydroureter, and abdominal mass. The number of internal and external fistulas was significantly higher ($p<0.005$) in patients with abscess (75% and 41%, resp.) than in controls (31% and 11%). Paracolic extraperitoneal aggregates of gas extending into the psoas sheath, paracolic area or thigh were noted radiologically in four patients. All the patients ultimately required some form of surgery, such as drainage, diversion, or resection. Although 4 required only a single procedure and 10 are now in relatively good health, 8 patients have been subjected to from two to six major procedures to deal with the abscess, its sequelae, and the natural progression of the disease.

8416 PROCTOCOLITIS AND CROHN'S DISEASE OF THE COLON: A COMPARISON OF THE CLINICAL COURSE. (Eng.) Lennard-Jones, J. E.; Ritchie, J. K.; Zohrab, W. J. (St. Mark's Hosp., London, England). *Scand. J. Gastroenterol.* 1(2):477-482; 1976.

The clinical course of 130 patients with proctocolitis (PC) and 58 patients with Crohn's colitis (CC) was followed from the time of their first hospital admission during the decade 1963-1972. More PC patients (68%) were admitted with acute symptoms than those with CC (41%). Operation rates were similar, but urgent surgery was required more frequently in the PC group ($p<0.025$). After the first 2 yr, however, this rate in PC patients was low, but among CC patients it increased until the sixth year. The chance of requiring operation among CC patients was 72% within 6 yr of first admission compared with 44% among PC patients. Local surgery for anal lesions was more common in CC patients. The only significant difference in overall mortality ($p<0.01$) was during the first year, in which seven PC patients died but all the CC patients survived. Thereafter, the rates were similar, and the probability of surviving 8 yr was 81% in PC patients and 73% in CC patients. This study suggests that proctocolitis has an acute and potentially dangerous onset, but the illness appears to become less severe after survival for 1 yr; Crohn's colitis tends to be more chronic and progressive over several years, with a greater need for surgical treatment and a greater tendency to anal complications.

8417 COLONIC AND INFLAMMATORY BOWEL DISEASES. (Eng.) Janowitz, H. D.; Sachar, D. B.; Kern, F.; Kirsner, J.; Mendeloff, A.; Schuster, M.; Thayer, W.; *et al.* (Work group VIII, American Gastroenterological Association, Baltimore, MD). *Gastroenterology* 69(5):1140-1150; 1975.

8418 GRANULOMATOUS DISEASE OF THE INTESTINAL TRACT (CROHN'S DISEASE). (Eng.) Marshak, R. H. (Mount Sinai Sch. Medicine, New York, NY). *Radiology* 114(1):3-22; 1975.

8419 CROHN'S DISEASE IN THREE SUDANESE PATIENTS. (Eng.) El Masri, S. H.; Satir, A. A. (Dept. Surgery, Univ. Khartoum, Khartoum, Sudan). *East Afr. Med. J.* 52(5):284-293; 1975.

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8421 UNUSUAL COMPLICATIONS OF REGIONAL ENTERITIS: DUODENOBILIARY FISTULA AND HEPATIC ABSCESS. (Eng.) Zarnow, H.; Grant, T. H.; Spellberg, M.; Levin, B. (St. Francis Hosp., 929 N. St. Francis, Wichita, KS 67214). *JAMA* 235(17):1880-1881; 1976.

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See also, 7918, 7919, 7941, 8399.

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ABSTRACTS
AND
CITATIONS

ATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism an Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mm	millimeter(s)
ADP	adenosine diphosphate	mOsm	milliosmolar; milliosmeter(s)
AMP	adenosine monophosphate	msec	millisecond(s)
amp	ampere	mV	millivolt(s)
ATP	adenosine triphosphate	min	minute(s)
A	angstrom	MTD	maximum tolerated dose
BSP	sulfobromophthalein	NAD	nicotinamide adenine dinucleotide
C	degrees centigrade	NADH	reduced nicotinamide adenine dinucleotide
cal	calories	NADP	nicotinamide adenine dinucleotidephosphate
cc	cubic centimeter	NADPH	reduced nicotinamide adenine dinucleotidephosphate
cm	centimeter(s)	ng	nanogram (10^{-9})
dl	deciliter	nm	nanometer(s)
DNA	deoxyribonucleic acid	Pa	ambient pressure
ED_{50}	median effective dose(s)	PAS	periodic acid - Schiff
EDTA	ethylenediamine tetraacetic acid	pg	picogram (10^{-12})
e.g.	for example	pgEq	picogram equivalent(s)
EEG	electroencephalogram	p.o.	orally
ESR	erythrocyte sedimentation rate	ppb	parts per billion
g	gram(s)	ppm	parts per million
μg	microgram(s)	r	Roentgen
Hz	Hertz	RBC	red blood cells (erythrocytes), red blood count
hr	hour(s)	resp.	respectively
i.m.	intramuscular	RNA	ribonucleic acid
i.p.	intraperitoneal	s.c.	subcutaneous
IU	international unit(s)	sec	second(s)
i.v.	intravenous	SGOT	serum glutamic-oxalacetic transaminase
kcal	kilocalorie(s)	SGPT	serum glutamic-pyruvic transaminase
kg	kilogram(s)	U	unit(s)
K_m	Michaelis constant	UV	ultraviolet
LD_{50}	median lethal dose(s)	V	volt
LDH	lactic acid dehydrogenase	WBC	white blood cells (leukocytes), white blood count
m	meter(s)	yr	year(s)
M	molar; mole(s)		
mM	millimolar; millimole(s)		
μM	micromolar; micromole(s)		
ma	milliampere(s)		
mCi, μCi	milli-, microcurie(s)		
mEq	milliequivalent(s)		
mg	milligram(s)		
ml, μl	milli-, microliter(s)		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

8423 QUANTITATIVE STUDY OF DUODENAL SEROTONIN-PRODUCING CELLS IN RABBIT FETUS. (Fre.) L'Hermite, A.; Lefranc, G.; Pradal, G.; Andre, M. J.; Tusques, J. (Laboratoire d'Histologie et Embryologie, Faculte de Medecine, 1 rue Gaston Veil, 44035 Nantes Cedex, France). *C. R. Soc. Biol.* 169(4):1034-1040; 1975.

The number and distribution of duodenal serotonin-producing cells were determined in fetal rabbits. Serial sections (total, 400) of duodenum both proximal and distal to the pylorus were prepared by Falck's method from 21-, 22-, 23-, and 25-day-old fetuses. The earliest serotonin cells (SC) appeared around the 20th day of gestation. By 22 days, their number was appreciable, and they increased markedly between days 23 and 25. In general, the number of cells varied directly with weight and age. At 21-22 days, the number of fluorescent cells at the pylorus level was lowest, increasing gradually distally. By day 22, the cell pattern was either relatively constant, before it began oscillating regularly, or there was neither stabilization nor regular variation. The relatively constant pattern is assumed to be the duodenal rudiment. Mucosal samples taken from the same site in different fetuses of the same age and weight never showed the same concentration of serotoninergic cells. Two consecutive mucosal segments from the same fetus were more comparable; however, there was no significance between the proximal and distal segments.

8424 REGULAR STRUCTURES IN UNIT MEMBRANES. II. MORPHOLOGICAL AND BIOCHEMICAL CHARACTERIZATION OF TWO WATER-SOLUBLE MEMBRANE PROTEINS ISOLATED FROM THE SUCKLING RAT ILEUM. (Eng.) Jakoi, E. R.; Zampighi, G.; Robertson, J. D. (Dept. Anatomy, Duke Univ., Durham, NC 27710). *J. Cell Biol.* 70(1):97-111; 1976.

Specialized plasma membranes from the endocytic complex of ileal epithelial cells of suckling Sprague-Dawley rats were isolated by differential flotation to determine their morphological and biochemical characteristics. Homogenates of epithelial scrapings from the ileum were centrifuged on a sucrose step gradient to isolate the endocytic membrane. The purity of the membrane fractions was assessed by electron microscopy, using thin sectioning and negative stain techniques. In cross sections at higher power, the membranes had a characteristic trilaminar structure about 8-nm thick, with one leaflet decorated with discrete particles about 7.5 nm in diameter and spaced about 14.5 nm apart. Low specific activities of α-galactosidase and β-glucuronidase (β-Glu) were detected in the isolated membrane fractions, as well as in the whole homogenate. A low specific activity of acid phosphatase was found, indicating a 33% enrichment of this enzyme in these fractions. Some β-Gal activity was also present at 35% of its total specific activity in the whole homogenate. The predominant disaccharidase activity associated with the isolated membranes was *n*-acetyl-β-glucosaminidase (NAG); approximately 98% of specific activity in the total homogenate was retained in this fraction. The particulate coating was released from the membrane surfaces by 10 mM $CaCl_2$ and recovered free of membranes after dialysis against 5 mM EGTA and high speed centrifugation. Two proteins were found by gel filtration to be in the supernatant: NAG and a filamentous protein, which attached *n*-acetylglucosaminidase to the membrane surface, thereby providing bidirectionality to the array of enzyme. The results suggest that the membranes of the endocytic complex are sites for the extracellular digestion of the carbohydrate moieties in the maternal milk.

8425 LIGHT MICROSCOPY, ELECTRON MICROSCOPY AND CLINICAL FINDINGS IN ORTHOTOPIC ALLOGENIC PORCINE LIVER HOMOGRAFTS. (Ger.) Mahnke, P.-F.; Cossel, L.; Schwarzer, R.; Otto, U. (Pathologisches Institut, Karl-Marx-Universitat, 701 Leipzig, Liebigstrasse 20, E. Germany). *Zentralbl. Allg. Pathol.* 119(6):495-526; 1975.

A uniform conception of pathogenetic events in porcine liver homografts was developed from macroscopic, light and electron microscopic, clinical, and paraclinical data harvested from 39 transplant experiences. The total ischemia time for the transplanted liver was 3-3.5 hr. The liver was placed in an orthotopic position in the hepatectomized host, and arterialization was followed by direct anastomosis with the common hepatic artery. The anastomotic sequence included suprahepatic vena cava, hepatic artery, portal vein, subhepatic vena cava, and sutured cholecystoduodenostomy. Survival time varied from a few hours to 179 days; 15 patients died within 24 hr. There was a 100% leukopenia immediately postoperatively, followed by a 60% leukocytosis up to day 15; a gradual leukopenia and erythrocytopenia began at weeks 16 or 17. Elevated SGOT and LDH were normalized in 1 week. Serum bilirubin changed little. The principal causes of death were hemorrhagic diathesis (15), postoperative gastric ulcer with massive hemorrhage (12), pneumonia (5), and cholangitis (2). The livers were unexceptional in 14 cases; perfusion disturbances, including infarction, occurred in 12 instances, fatty liver in 6, icterus in 5, fibrosis or cirrhosis in 2, and viral hepatitis in 10. Vacuolization, hyaline deposition, fibrin precipitation, and defective hepatocyte membranes (abnormally high permeability) were identified microscopically. The smooth endoplasmic reticulum was especially prominent. Organelle modification was attributed to adaptive hypertrophy (metabolic activation), which, in conjunction with altered permeability, can progress to partial peripheral lysis and total lytic necrosis. These are probably signs of late rejection by sensitized host lymphocytes. There was also a strong suspicion that donor Kupffer cells attack host lymphocytes. The clinically and functionally compensated late phase presented a histological picture resembling chronic active hepatitis.

8426 HISTOCHEMICAL STUDIES ON THE ALBINO RAT PANCREAS IN DIFFERENT PERIODS FOLLOWING VAGOTOMY AND SIMULTANEOUS PYLOROMYOTOMY. (Eng.)

Wesolowski, H.; Snop, S. (Pomeranian Medical Acad., Al, Powstancow 72, 70-111 Szczecin, Poland). *Folia Histochem. Cytochem. (Krakow)* 13(1/2):85-92; 1975.

The effect of complete subphrenic vagotomy and simultaneous pyloromyotomy on the morphological state and activities of some intracellular enzymes of the albino rat was studied histochemically. Within the first weeks after vagotomy, the pancreatic acini diminished in size, and the β-cells in the islets of Langerhans became edematous. In the acini, the activities of succinate dehydrogenase, cytochrome oxidase, "AS" naphthol acetate esterase, and glucose-6-phosphatase declined, but the reactions for beta-glucuronidase and aryl sulfatase showed intensifications and polymorphic behavior both in acinar and in islet cells. The islet cells, particularly the β-cells, simultaneously revealed enhanced activities of succinate dehydrogenase, cytochrome oxidase, β-glucuronidase, and aryl sulfatase and an entire disappearance of the reaction for glucose-6-phosphatase. The α-cells increased their "AS" naphthol acetate esterase activity. Five weeks after vagotomy, morphological and enzymatic changes in the acini and islet cells were negligible, and after 5 and 9 months, no differences were noted between the vagotomized rats and the control animals. Data from other studies support the view that the activity changes observed in the present study may be due to a temporary degradation of cell structures following the cutting of the vagi. Resumption of a normal enzymatic activity these cells within 5 months of vagotomy supports this view.

8427 EXPERIMENTAL XENOGENIC IMMUNE PANCREATITIS. 1. HISTOLOGICAL FINDINGS IN THE MOUSE EXOCRINE PANCREAS AFTER TREATMENT WITH ANTI-MOUSE PANCREAS RABBIT SERUM. (Ger.)

Nizze, H. (Institut fur Allgemeine und Spezielle Pathologie, Universitat Rostock, DDR-25 Rostock 1, Strempelstrasse 14, E. Germany). *Exp. Pathol. (Jena)* 11(1/2):10-20; 1975.

The morphological alteration in exocrine mouse pancreas (MP) after challenge by xenogenic immune MP antiserum is analyzed. The test groups included 35 mice with anti-MP rabbit serum (group A), 14 with normal rabbit serum (group B), 16 with physiological saline (group C), and 6 untreated controls. The test groups received 1, 3, 5, 9, 17, or 33 injections, i.p., of 0.3 ml serum or saline for 0, 1, 2, 4, 6, 8, or 16 days. In group A, the MP was hyperemic and edematous in 3 hr; by day 33, it was smaller, pale, and resistant. The edema was inter- and intralobular and periacinar, with multiple acinar cell necroses by days 2-3 leading to focal immobilization of entire lobules. The cytoplasm was finely vacuolated and hypertrophic, the nucleus was relatively unaffected. Infiltration of eosinophils and neutrophils preceded that of histiocytes, lymphocytes, and later, plasma cell invasion in affected acinar fields. By day 17, there was dense stromal proliferation in the parenchyma, with evidence of ductal regeneration. By day 28 after the final injection, the edema and acinar necroses had disappeared, with reduced interstitial fibrosis in the submesothelium and small, local periductal, interlobular, and periinsular lymphocyte clusters. The chronic sclerosing pancreatitis changed into focal perivascular lipomatosis in 4 weeks in mice treated more than 16 days. Group B mice experienced only local interstitial edema qualitatively similar to that in group A, but quantitatively negligible in comparison. Group C showed minute alterations in subperitoneal stroma. The acinar necroses are expressions of cytotoxic immune aggression. The cellular response is both a resorptive reaction to the cytotoxic damage and an immunologic or delayed-type reaction of serum sickness, following repeated inoc lation.

8428 ULTRASTRUCTURAL ASPECTS IN THE PATHOGENESIS OF DEOXYCHOLATE PANCREATITIS. (Ger.)

Backwinkel, K. P.; Schriewer, H.; Rauen, H. M.; Themann, H. (Medizinische Klinik und Poliklinik der Universitat, D-4400 Munster/Westfalen, Westring 3, W. Germany). *Res. Exp. Med. (Berl.)* 166(1):43-52; 1975.

Modifications of the exocrine pancreas after deoxycholate (DOC) administration were studied electron microscopically. DOC (0.7 ml) was administered i.p. to 55 male rats, who were then sacrificed at 0 to 54 hr. Focal degeneration in the mitochondria and endoplasmic reticulum (ER) occurred in 2-4 hr, with the presence of osmiophilic fragments. By 12 hr, the osmiophilic deposits had increased, especia ly between the ER membranes. The accumulations became subsequently confluent, forming structures that were either empty or filled with membrane fragments. Later, the empty vacuoles were filled with amorphous material of varying electron densities. Zymogen granulation was apparent in the larger foci At 54 hr, the affected cells showed a structure-fre thickened cytoplasm in which collapsed rough ER was visible. Zymogen fusion led to inclusion body form tion. In addition to prominent interstitial edema, a neutrophil excess was found. However, many exten ed tissue sections remained unaltered by DOC. Base on comparable liver studies, a disturbance to the membrane lipid metabolism is proposed. DOC reflux in the pancreatic duct could explain the origin of acute pancreatitis.

8429 COLCHICINE ADMINISTRATION TO MICE: A MET BOLIC AND ULTRASTRUCTURAL STUDY. (Eng.)

Singh, A.; Le Marchand, Y.; Orci, L.; Jeanrenaud, B (Geneva Univ. Medical Sch., Geneva, Switzerland). *Eur. J. Clin. Invest.* 5(6):495-505; 1975.

8430 THE DUODENAL GLANDS OF FOURTEEN PRIMATE SPECIES. (Eng.)

Krause, W. J. (Sch. Med cine, Univ. Missouri, Columbia, MO 65201). *Acta Anat. (Basel)* 93(4):580-589; 1975.

31 ULTRASTRUCTURE OF THE LIVER AND THE SPLEEN
IN EXPERIMENTAL PORTAL HYPERTENSION.
ng.) Iwatsutsumi, Y.; Hayashi, J.; Yasunaga, M.;
to, A. (First Dept. Surgery, Gifu Univ., Gifu,
pan). *J. Clin. Electron Microsc.* 6(3/4):339-
0; 1973.

32 THE EFFECTS OF ELECTRICAL STIMULATION OF
THE AUTONOMIC NERVES AND OF DRUGS ON THE
ZE OF SALIVARY GLANDS AND THEIR RATE OF CELL DIVI-
ON. (Eng.) Muir, T. C.; Pollock, D.; Turner, C.
(Dept. Pharmacology, Univ. Glasgow, Glasgow G12
Q, Scotland). *J. Pharmacol. Exp. Ther.* 195(2):
2-381; 1975.

33 SURFACE ELECTRON MICROSCOPICAL CHANGES OF
THE GASTRIC MUCOSA IN EXPERIMENTAL PORCINE
RESS ULCERATION. (Eng.) Myllarniemi, H.; Kivi-
akso, E.; Lempinen, M. (Second Dept. Surgery, Univ.
lsinki, Haartmaninkatu 4, 00290 Helsinki 29, Fin-
nd). *Scand. J. Gastroenterol.* 10(8):833-838; 1975.

8434 ASPIRIN-INDUCED ULTRASTRUCTURAL CHANGES IN HUMAN GASTRIC MUCOSA. CORRELATION WITH POTENTIAL DIFFERENCE [Abstract]. (Eng.) Ivey, K. J.; Jeffrey, G. E.; Krause, W.; Baskin, W. N. (Veterans Admin. Hosp., Univ. Missouri, Columbia, MO). *Clin. Res.* 23(4):519A; 1975.

8435 RENEWAL OF GASTRIN CELLS IN THE ANTRUM OF THE MOUSE [Abstract]. (Eng.) Lehy, T.; Willems, G. (INSERM U-10, Hopital Bichat, F-75018, Paris, France). *Digestion* 13(3):177-178; 1975.

See also, 8481, 8592, 8958.

36 SMALL INTESTINAL PERMEABILITY. I. EF-
FECTS OF ISCHAEMIA AND EXPOSURE TO ACETYL
LICYLATE. (Eng.) Kingham, J. G. C.; Whorwell,
J.; Loehry, C. A. (Royal Victoria Hosp., Bourne-
uth, England). *Gut* 17(5):354-361, 1976.

study the permeability characteristics of the
all intestinal epithelial cell layer, the perme-
ility of the small intestinal mucosa of female
bbits was estimated using a perfusion technique
ter the epithelial layer was damaged either by 2
of ischemia or by exposure to acetyl salicylate.
chemia significantly increased intestinal perme-
ility to povidone, insulin, inulin, vitamin B_{12},
d creatinine (by 500, 470, 510, and 180%, resp.),
t was without effect on intestinal permeability
urea. For substances greater in size than cre-
inine, there was a constant increase in clearance
ter ischemia; thus, for larger molecules, perme-
ility was increased but selectivity was unaltered.
posure to un-ionized acetyl salicylate (pH 2.6,
min) also increased the intestinal permeability
povidone, inulin, vitamin B_{12}, and creatinine
y 740, 720, 810, and 170%, resp.). Both proce-
res produced a derangement of the epithelial cell
yer of the villous tips, without damage to the
ithelial basement membrane or subepithelial struc-
res. It is concluded that the epithelial cell
yer is purely rate-limiting, with no selective
nction, and that the role of selectivity must be
cribed to either or both of the other mucosal bar-
ers, the capillary and the epithelial basement
mbrane.

8437 INTESTINAL CALCIUM TRANSPORT: PARATHYROID HORMONE AND ADAPTATION TO DIETARY CALCIUM. (Eng.) Ribovich, M. L.; DeLuca, H. F. (Dept. Biochemistry, Coll. Agricultural Life Sciences, Univ. Wisconsin-Madison, Madison, WI 53706). *Arch. Biochem. Biophys.* 175(1):256-261; 1976.

The relation between the parathyroid hormone system and the adaptation of intestinal Ca absorption to dietary Ca was investigated in male Holtzman rats. Sham-operated rats maintained for 12 days on a low-calcium diet (0.1%) and given 1,25-dihydroxyvitamin D_3 (250 ng, p.o.) daily had a significantly higher mean intestinal calcium transport ratio (serosal ^{45}Ca/mucosal ^{45}Ca=9.5) than rats on either a vitamin D-supplemental normal calcium diet (0.47% Ca, transport ratio=5.2) or a vitamin D-supplemented high calcium diet (1.2% Ca, transport ratio=5.5). This effect was eliminated in another group of rats 4 days after thyroparathyroidectomy; the thyroparathyroidectomized animals on the low calcium diet had a transport ratio (4.9) that was significantly lower than that of sham-operated rats on a low calcium diet. Thyroparathyoidectomy had no effect on calcium transport of rats on either the normal or high calcium diet. The chronic administration of a constant exogenous source of parathyroid hormone (40 U/8 hr/100 g parathyroid extract) to thyroparathyroidectomized rats supplemented with vitamin D resulted in high rates of intestinal calcium transport in rats fed diets containing 0.02% calcium (transport ratio =6.1) or 2.0% calcium (6.7). Since 1,25-dihydroxyvitamin D_3 supplementation eliminates adaptation of intestinal calcium transport to a low calcium diet in a similar manner, these results support the suggestion that the parathyroid glands mediate intestinal adaptation by the stimulation of 1,25-dihydroxyvitamin D_3 biosynthesis by secreted parathyroid hormone.

8438 Na^+-K^+-ACTIVATED ADENOSINE TRIPHOSPHATASE AND INTESTINAL ELECTROLYTE TRANSPORT: EFFECT OF ADRENAL STEROIDS. (Eng.) Charney, A. N.; Kinsey, M. D.; Myers, L.; Giannella, R. A.; Gots, R. E. (Dept. Gastroenterology, Walter Reed Army Medical Center, Washington, DC 20012). *J. Clin. Invest.* 56(3):653-660; 1975.

To help delineate the role of adrenal steroids in intestinal transport, changes in intestinal electrolyte and water transport were induced in male Walter Reed rats by injecting methylprednisolone (3 mg/100 g) or deoxycorticosterone (DOCA, 0.5 mg/100 g) s.c. daily for 3 days. Untreated normal litter mates served as controls. Twenty-four hours after the last steroid injection, the small intestine and colon of the experimental rats were perfused *in vivo*, and mucosa specimens from the jejunum, ileum, and colon were assayed for adenosine triphosphatase (ATPase) and adenylate cyclase activity. Methyl-prednisolone increased sodium and water absorption, and potassium secretion in the jejunum, ileum, and colon. It resulted in mean transmural electrical potential differences of 10.1, 16.5, and 43.9 mV in the jejunum, ileum, and colon, resp., which had been perfused with isotonic saline containing 56 mM glucose; these values were significantly increased over values in control intestine (6.8, 4.2, and 14.6 for jejunum, ileum, and colon, resp.), which had also been perfused with glucose. These changes were accompanied by marked increases in Na-K-ATPase activity in each intestinal segment. Examination of isolated epithelial cells demonstrated that the jejunal and ileal increase in Na-K-ATPase occurred in both the villus tip and crypt areas. The mean control values in the jejunum were 74.7 and 33.7 μmol Pi/mg protein/hr for the villus tip and crypt, resp.; in the ileum, they were 60.2 and 29.7 μmol Pi/mg protein, resp. In the jejunum of methylprednisolone-treated animals, the values were 108.0 and 52.1 μmol Pi/mg protein/hr for villus tip and crypt, resp., and 101.0 and 59.6 μmol Pi/mg/hr, resp., in the ileum. The time-courses of the ileal enzyme and transport changes were identical. Permeability, Mg-ATPase, and adenylate cyclase activities were unchanged by methylprednisolone. DOCA increased sodium and water absorption (approximately 100%), potassium secretion, and Na-K-ATPase activity in the colon only. The transmural electrical potential difference was significantly higher in only the colon (38.7 mV) after DOCA treatment and glucose perfusion, in comparison with that in controls (14.6 mV). Colonic Mg-ATPase and adenylate cyclase activities, jejunal and ileal enzyme activity, electrolyte transport, and permeability were unchanged by DOCA. Methylprednisolone and DOCA were not additive in their effect on colonic Na-K-ATPase activity. The two substances increased electrolyte and water transport and Na-K-ATPase activity concomitantly in specific segments of small intestine and colon. These data are consistent with an important role for Na-K-ATPase in intestinal electrolyte and water transport.

8439 ENTERAL SODIUM AND FLUID TRANSPORT BEFORE AND AFTER RADIATION EXPOSURE. PHYSIOLOGICAL INVESTIGATIONS ON AWAKE RATS. I. UPPER SMALL INTESTINE. (Ger.) Herzer, R. (Strahleninstitut der Universitat Tubingen, 7400 Tubingen, W. Germany) *Strahlentherapie* 147(5):531-543; 1974.

The effect of gamma radiation on water and sodium transport as a function of dose level, postexposure terval, and osmolarity of the perfusion solution and bowel segment was studied. Awake, nonnarcotized Sprague Dawley rats were laparotomized, and a 10-cm loop of upper jejunum was mobilized for extracorporeal perfusion. Whole body radiation was performed at 500 and 1,000 rads. Perfusion fluids included water (hypotonic), 0.9% NaCl (isotonic), and 1.8% NaCl (hypertonic) and were administered at 12-16 hr and 36-40 hr after radiation. Preradiation perfusion with water was resorptive only. Postradiation, with increasing dose and time, there was a continuous decrease in net resorbed volume to half the normal. Isotonic transport was also resorptive, but of smaller magnitude. Postradiation, the decrease was proportional to dose and time: at 36-40 hr after 1,000 rads, the flow was one-quarter of the initial level. Radiation also reduced the compensatory intraluminal sodium transport in both the isotonic and hypotonic cases. The hypertonic flow was decreased by half after radiation, and the intraintestinal sodium accumulation fell 2.38 μEq/cm^2 36-40 hr after 1,000 rads. The isolated influence of dose and interval and their reciprocity showed a predominance of the time factor. in contras to the dose, in the hypo- and isotonic range.

8440 Na^+ AND Cl^- TRANSEPITHELIAL ROUTES IN RABBIT GALLBLADDER: TRACER ANALYSIS OF THE TRANSPORTS. (Eng.) Cremaschi, D.; Henin, S. (Istituto di Fisiologia Generale, Universita degli Studi di Milano, Via Mangiagalli 32, I-20 133 Milan, Italy *Pfluegers Arch.* 361(1):33-41; 1975.

Na^+ and Cl^- transport were studied in the rabbit gallbladder by chemical and radiochemical methods. Na^+ influx through the luminal barrier over 45 sec was reduced from a control level of 20.8 μmol/cm^2/hr to a level of 12.7 μmol/cm^2/hr in Cl^--free bathing solution, and Cl^- transport was reduced from a control level of 23.0 μmol/cm^2/hr to 10.9 μmol/cm^2/hr in Na^+-free solution. Further experiments revealed that influx was dependent on both luminal and cellular ion concentrations. Cellular Cl^- labeling with $^{36}Cl^-$ (1-hr incubation) was almost completely abolished in Na^+-free bathing solution, but cellular Na^+ labeling with $^{22}Na^+$ in the lumen did not change in a Cl^--free bathing solution. Cellular Na^+ and Cl^- labeling through the basolateral membrane wa negligible; some Cl^- labeling was obtained only when the intracellular electrical potential was reduced. Fluid transport was completely abolished when the ma nion in the incubating solution was SO_4^{2-}, i.e., an nion that does not enter the cell, but can diffuse nrough the epithelium via an extracelluar pathway. ne results suggest that Na^+ and Cl^- cotransport takes lace through the cell luminal barrier and that Na^+ s actively extruded through the basolateral membrane.

441 ION TRANSPORT BY RABBIT COLON. I. ACTIVE AND PASSIVE COMPONENTS. (Eng.) Frizzell, . A.; Koch, M. J.; Schultz, S. G. (Univ. Pittsburgh, ch. Medicine, Pittsburgh, PA 15261). *J. Membr. iol.* 27(3):297-316; 1976.

he movements of Na, Cl, and K across the rabbit escending colon were studied under short-circuit onditions, and the passive fluxes of these ions cross the epithelium were evaluated using a voltage-lamp procedure. The effects of ion replacement, uabain, amiloride, and cyclic AMP were also studied. he colon, stripped of the muscularis externa, bsorbed Na and Cl under short-circuit conditions, ut net K transport was not observed. The colon xhibited a residual ion flux, and the magnitude as approximately equal to the rate of active Cl bsorption [short-circuit current=2.8 μEq/cm^2; et Na transport=3.0 μEq/cm^2]. The short-circuit urrent was abolished in Na-free solutions, suggestng that it is determined solely by the rate of ctive Na transport; the results of further ion eplacement studies and treatment with ouabain or miloride supported this conclusion and suggested hat the net movements of Cl and HCO_3 are mediated y a Na-independent, electrically-neutral, anion xchange process. Cyclic AMP stimulated an elecrogenic Cl secretion, abolished HCO_3 secretion, ut did not affect the rate of Na absorption nder short-circuit conditions. Studies of he effect of transepithelial potential differnce on the serosa-to-mucosa fluxes of Na, K, and l suggested that the total fluxes of Na and K, and ne-third of Cl may be attributed to ionic diffusion. he permeabilities of the passive conductance pathay(s) were such that the ratio of the permeabiliies of K:Na:Cl were 1.0:0.07:0.11. Electrolyte ransport by *in vitro* rabbit colon closely resembles hat reported for *in vivo* studies of mammalian colon nd may serve as a useful model for the further tudy of colonic ion transport mechanisms.

442 RENAL CONTROL OF INTESTINAL SODIUM AND WATER TRANSPORT IN THE DOG. (Eng.) Nizet, A.; obin, M.; Merchie, G. (Hopital de Baviere, Boulevard e la Constitution, 66, B-4020 Liege, Belgium). *fluegers Arch.* 364(1):59-64; 1976.

xperiments were carried out in dogs to determine hether the impairment of jejunal sodium and water bsorption by i.v. saline infusion depends on the revious dietary sodium intake and whether the sensitivity of the jejunum to this infusion is modulated y a humoral material released into the blood by the idney. Twenty dogs received a sodium-depleted diet (0.15 mEq Na/kg/day) and 10 dogs received a sodium-nriched diet (24 mEq/kg/day) for 2 weeks. While the net intestinal transport was reduced after the saline infusion in sodium-loaded animals, no response was observed in the dogs that had been on sodium-depleted diets, despite identical changes in arterial pressure, intravascular volume, and blood dilution indexes. When the kidneys were removed from sodium-loaded animals and transplanted to the neck vessels of the sodium-deprived dogs, the sodium and water absorption during the saline infusion was impaired. This demonstrates that the presence of a humoral message of renal origin in the blood is required to permit the inhibition of net transport. These experiments suggest that the kidney might modulate sodium transport in the jejunum, and perhaps elsewhere in the body, by way of an additional endocrine function.

8443 THE EFFECT OF IRON STORES ON IRON ABSORPTION IN THE RAT: THE POSSIBLE ROLE OF CIRCULATING FERRITIN. (Eng.) Greenman, J.; Jacobs, A. (Welsh Natl. Sch. Medicine, Heath Park, Cardiff, Wales). *Gut* 16(8):613-616; 1975.

The relation between Fe absorption and the body Fe stores plus the effect of elevating the serum ferritin concentration during absorption were studied in 3-month-old male Wistar rats. Storage Fe was increased by i.m. injections of 5 mg on alternate days, for a total of 5-50 mg Fe. Fourteen days after the last injection, a solution containing 5 μg of ^{59}Fe ferric ammonium sulfate was administered by stomach tube, and the total radioactivity in the rat was counted immediately 7 days later. In the second experiment, rats were perfused i.v. (for 45 min) with 0.9% sterile sodium chloride solution alone (controls) or with a solution containing 100 μg of rat ferritin. Fifteen minutes after the perfusion was begun, 1 ml of ^{59}Fe ferric ammonium sulfate solution was introduced into the gut through an intestinal cannula. At the end of the perfusion, the absorption of ^{59}Fe by the gut was estimated. In the first experiment, correlations were noted between the amount of Fe injected and serum Fe concentration ($p<0.05$) and between the former and transferrin saturation ($p<0.01$). There was no correlation between serum Fe concentration or transferrin saturation and Fe absorption. There was a significant negative correlation between the liver nonheme Fe concentration and Fe absorption ($p<0.001$). In the second experiment, there was a 100-fold increase in serum ferritin concentration and a slight increase in serum Fe concentration and transferrin saturation after ferritin perfusion. However, there was no difference in Fe absorption between the control and ferritin groups and there was no difference in the proportion of administered Fe taken up by the intestinal mucosa. These data suggest that although the amount of storage Fe regulates Fe absorption in the rat, it does not do so simply through variations in the circulating ferritin concentration.

8444 INFLUENCE OF ASPIRIN, ANTACIDS, ALCOHOL, AND BILE ACIDS ON TRANSMURAL POTENTIAL DIFFERENCE OF THE HUMAN STOMACH. (Ger.) Caspary, W. F. (Abteilung Gastroenterologie und Stoffwechselkrankheiten, Medizinische Universitatsklinik, 34 Gottingen, Humboldtalle 1, W. Germany). *Dtsch. Med. Wochenschr.* 100(23):1263-1268; 1975.

The effects of alcohol, antacids, bile acids, and aspirin on the gastric mucosal barrier of healthy persons were measured by changes in transmural potential (TMP). The test group consisted of 10 fasting young adult volunteers. Circuitry was maintained by two agar-KCl-filled tubes: one inserted intragastrically and one placed in a peripheral arm vein. The test agents, administered by gavage, included 1,000 mg aspirin (ASP), 1,000 mg antacid-aspirin (AASP), 50 ml ethyl alcohol (EA), 40 ml commercial whiskey (18 g alcohol), 250 ml commercial wine (17.5 g alcohol), a 5.5 mM bile acid mixture (4 mM taurocholic, 1 mM chenodeoxycholic, 0.5 mM deoxycholic acid), and 640 mg of citrate-buffered ASP. ASP elicited a massive drop in TMP beginning at 1 min and peaking at 10 min. Simultaneous AASP significantly weakened the voltage drop. There was no change in TMP after buffered ASP. Administration of 10 ml antacid (Gelusil) alone increased the intragastric pH. EA significantly lowered the TMP, compatible with its stimulation of hydrogen ion back-diffusion. Both whiskey and wine also elicited TMP decreases; initial TMP was not restored even after 40 min. The bile acid mixture and ox bile induced a TMP drop. TMP is concluded to be a simple diagnostic procedure for assaying functional mucosal changes.

8445 THE SPECIFICITY OF BILE SALTS IN THE INTESTINAL ABSORPTION OF MICELLAR CHOLESTEROL IN THE RAT.

(Eng.) Watt, S. M.; Simmonds, W. J. (Dept. Physiology, Univ. Western Australia, Nedlands 6009, Western Australia). *Clin. Exp. Pharmacol. Physiol.* 3(4):305-322; 1976.

The importance of solubilization in cholesterol absorption and the effects of different bile salts on the mucosal metabolism and lymphatic output of cholesterol were investigated using two different *in vivo* techniques. Bile diverted lymph fistula Wistar rats were infused intraduodenally at a steady rate with a constant lipid mixture containing (4-^{14}C)-cholesterol, (9,10-$^{3}H_2$)-oleic acid and monoolein. The lipids were completely solubilized in either bile salts or a non-toxic non-ionic detergent, Pluronic F68. Labeled fatty acid was efficiently absorbed from either micellar infusate, but virtually no labeled cholesterol appeared in the lymph in the absence of bile salts. Short-term perfusions of the intestine of anesthetized rats with the same micellar perfusates showed approximately 20% of the labeled cholesterol in the mucosa after 30 min perfusion with the bile salt micellar solutions. When the nonionic micelles were used, no isotopic cholesterol left the lumen. Mucosal uptake of labeled cholesterol was linearly dependent on the concentration of solubilized cholesterol in the perfusate and was not dependent on the bile salt concentration. After 30 min, the total amount of perfused isotopic cholesterol was recovered from either the lumen or the mucosa, but some fatty acid appeared to have been transported away from the mucosa by this time. The initial rate of mucosal uptake of labeled cholesterol was similar from micellar perfusates using either taurocholate, taurodeoxycholate, or taurofusidate. In contrast, after 8 hr of infusion, lymphatic output of labeled cholesterol was markedly greater with taurocholate. The increased lymph output with taurocholate was associated with an increase in the esterified fraction of both labeled and unlabeled cholesterol. Fatty acid was absorbed and esterified equally from all three types of perfusate. These results suggest that for the first step in cholesterol absorption, uptake from the lumen, solubilization by a planar detergent is essential. After uptake, the more rapid transfer of cholesterol to lymph in the presence of trihydroxy bile acids appears to be related to a more efficient esterification of cholestero but not to a more efficient resynthesis of triglyceride.

8446 THE BIGUANIDE INHIBITION OF D-GLUCOSE TRANSPORT IN MEMBRANE VESICLES FROM SMALL INTESTINAL BRUSH BORDERS.

(Eng.) Kessler, M.; Meier, W.; Storelli, C.; Semenza, G. (Laboratorium fur Biochemie der ETH-Zurich, Universitatstrasse 16, CH-8006 Zurich, Switzerland). *Biochim. Biophys. Acta* 413(3):444-452; 1975.

The biguanide inhibition of D-glucose transport in membrane vesicles from small intestinal brush borders was investigated in the rabbit to determine the effect of Na$^+$ on the uptake. Tissues were homogenized in hypotonic medium. After addition of Ca^{2+}, the brush border vesicles were prepared by differential centrifugation. The vesicles had undetectable levels of cytochrome oxidase, (Na$^+$ + K$^+$)-ATPase and nucleic acids, and had a sucrase specific activity o 1.4 U/mg protein. Uptake of labeled sugars was measured at 20 C in *N*-2-hydroxyethylpiperazine-*N'*-2-ethanesulfonic (HEPES) Tris buffer, pH 7.5. Concentrated D-glucose uptake was inhibited by 2.5 mM phenethylbiguanide more at low than at high external bulk concentrations of NaCl (100 mM NaCl, 25 mM NaCl + 75 mM choline chloride, and 10 mM NaCl + 90 mM choline chloride). Increased bulk concentrations of NaCl counteracted the biguanide-induced inhibition. The D-glucose uptake in 25 mM NaCl + biguanide approached that in 10 mM NaCl without biguanide. At constant Na$^+$ and biguanide concentrations, increasing the ionic strength (from 25 mM NaCl + 75 mM choline chloride to 25 mM NaCl alone) reduced inhibition by biguanides. Equilibrative D-glucose uptake was inhibited by biguanides, and the inhibition was dependent on the concentration of NaCl. The uptakes of other sugars (D-fructose and L-glucose), which are Na-independent, were not affected by biguanides. The effect of biguanides on D-glucose uptake in brush border vesicles is within the framework of the cotransport theory of Na activation of glucose/galactose transport across the brush border pole of small intestinal cells.

8447 THE ACTIVITY OF SOME INTESTINAL MUCOSAL ENZYMES IN THE ABSORPTION OF THIAMINE.

(Rus.) Kiriliuk, A. G. (Kiev Medical Inst., Kiev, USSR). *Vopr. Pitan.* (2):11-15; 1976.

Five-centimeter segments from the small intestine

male albino rats were isolated using ligatures,
d the gut section was perfused with thiamine-
ntaining physiologic saline. The absorption rate
vitamin B_1 decreased from 67% when the thiamine
ncentration in the perfusate was 3.1 μM to 47%
en the concentration was 12.3 μM. The accumula-
on of the phosphorylated thiamine was accompanied
the activation of the thiaminepyrophosphatase.
sorption of the physiological amount of thiamine
.1 μM) increased activity of the $(Na^+ + K^+)$-activ-
ed ATPase; a further increase of the vitamin B_1
ncentration (up to 24.6 μM) did not change the
tivity of the enzyme. The results indicate that
tivity of the $(Na^+ + K^+)$-activated ATPase is the
miting factor in the absorption of the large doses
the thiamine.

48 EVIDENCE FOR ACTIVE TRANSPORT OF TRIPEPTIDES BY HAMSTER JEJUNUM IN VITRO. (Eng.)

dison, J. M.; Burston, D.; Payne, J. W.; Wilkinson,
; Matthews, D. M. (Westminster Medical Sch., 124
uxhall Bridge Road, London SW1V 2RH, England).
in. Sci. Mol. Med. 49(4):305-312; 1975.

e characteristics of uptake by *in vitro* hamster
junum of three poorly hydrolyzed peptides, glycyl-
rcosylsarcosine (Gly-Sar-Sar), β-alanylglycylgly-
ne (β-Ala-Gly-Gly), and glycylsarcosylsarcosyl-
rcosine (Gly-Sar-Sar-Sar), were investigated.
y-Sar-Sar was taken up by a saturable mechanism
d accumulated intact in the intracellular compart-
nt of the intestinal wall, apparently against an
ectrochemical gradient. In a representative series
incubations, the uptake of Gly-Sar-Sar (5 μmol/
) was: Gly-Sar-Sar 7.2 ± 1.2 μmol/20 min/g
itial wet weight; Gly 2.0 ± 0.41 μmol/20 min/g;
d Sar 0.39 ± 0.06 μmol/20 min/g. Its uptake was
duced by Na^+-replacement, anoxia, and metabolic
hibitors. Uptake of Gly-Sar-Sar-Sar was very
or, and it was not concentrated in the intracel-
lar fluid of the rings. Like Gly-Sar-Sar, intact
-Ala-Gly-Gly was taken up by the intestinal tissue
a substantial scale, although uptake was less
tensive than that of the former peptide. Uptake
β-Ala-Gly-Gly was not accompanied by appearance
detectable amounts of β-Ala or Gly-Gly in the
ngs or in the incubation medium, or by a measure-
le increase in Gly; no additional chromatographic
ak that might have been β-Ala-Gly was detected,
that intestinal hydrolysis of this peptide
peared to be negligible. Uptake was inhibited by
oxia, 2,4-dinitrophenol, and Na^+ replacement.
e results suggest that tripeptides, like dipep-
ides, are actively transported into the absorptive
lls of the intestinal mucosa provided that they
scape brush border hydrolysis, but that the ability
f these cells to take up peptides by an active
echanism is unlikely to extend to tetrapeptides.

449 STUDIES ON INTRACELLULAR TRANSPORT OF SECRETORY PROTEINS IN THE RAT EXOCRINE PAN-REAS. V. KINETIC STUDIES ON ACCELERATED TRANSPORT OLLOWING CAERULEIN INFUSION IN VIVO. (Eng.)

Bieger,
.; Seybold, J.; Kern, H. F. (Dept. Anatomy, Univ. Heidelberg, Heidelberg, W. Germany). *Cell Tissue Res.* 170(2):203-219; 1976.

The finding that intracellular transport of secretory proteins in the rat exocrine pancreas is accelerated by *in vivo* stimulation with a pancreatic secretagogue was further analyzed. Using a radioassay for discharge of newly synthesized proteins, the rate of release was compared in control and prestimulated lobules. In control preparations, discharge occurred with an initial lag period of 30 min and a maximum after 2 hr of incubation. After *in vivo* infusion of cerulein (5×10^{-8} g/hr) for 24 hr, *in vitro* discharge started after 10 min incubation and attained a maximal rate after 1 hr. Using the same radioassay and several inhibitors of intracellular transport and granule discharge, both processes were reduced to the same extent in controls and in lobules with accelerated transport. To obtain direct evidence for the degree of acceleration of the different transport steps between rough endoplasmic reticulum, Golgi complex and zymogen granules, the respective subcellular fractions of these organelles were prepared and characterized ultrastructurally and biochemically. The rate of disappearance of newly formed proteins from rough microsomes and the appearance in smooth microsomes and zymogen granules were significantly increased after *in vivo* stimulation. The data substantiate an acceleration of the regular transport steps by the secretagogue. There was no indication that a high level of secretory activity leads to a rerouting of secretory proteins or to an omission of one of the regular steps in intracellular transport.

8450 STUDIES ON TOCOPHEROL DERIVATIVES: V. INTESTINAL ABSORPTION OF SEVERAL d,l-3,4-$^3H_2$-α-TOCOPHERYL ESTERS IN THE RAT. (Eng.)

Nakamura, T.; Aoyama, Y.; Fujita, T.; Katsui, G. (Dept. Drug Metabolism, Section Experimental Therapeutics Res., Eisai Co., Ltd., Koishikawa, Bunkyo-ku, Tokyo 112, Japan). *Lipids* 10(10):627-633; 1975.

The *in vitro* and *in vivo* absorption of d,l-3,4-$^3H_2$-α-tocopheryl esters by the intestine and lymphatics was studied using male Wistar rats. The acetate, propionate, butyrate, isobutyrate, caprylate, palmitate, acid succinate, benzoate, nicotinate, o-hydroxybenzoate, o-acetoxybenzoate, and pivalate esters were synthesized. They were incubated with rat bile pancreatic juice or with the supernatants of liver or small intestine homogenates. Hydrolysis was determined by thin-layer chromatography. In the *in vivo* experiments, thoracic-duct-fistula rats were given 1.15 μmol of labeled ester, and lymph was collected for 12 hr at hourly intervals to determine the lymphatic absorption rate. Irrespective of chain length, the straight chain esters were hydrolyzed equally in bile and pancreatic juice. The branched chain esters were hydrolyzed at a much slower rate, and the rates of the aromatic esters were minimal. In both bile and pancreatic juice and the supernatants, extensively branched esters such as pivalate resisted hydrolysis. In the supernatants, the long-chain fatty acid esters and aromatic esters were hydrolyzed very slowly. The rate decreased in the following order: acetate, propionate, butyrate, acid succinate, isobutyrate, caprylate, palmitate, and the aromatic esters. In the *in vivo* experiments, lymphatic absorption was highest with acetate and palmitate, followed by nicotinate, acid succinate, pivalate, and o-hydroxybenzoate. There was little correlation between lymph volume and the appearance of radioactivity in the lymph. Rats fed acetate, palmitate, and acid succinate esters absorbed the vitamin as α-tocopherol, but the pivalate ester appeared in the lymph predominantly unchanged. These data suggest that hydrolysis of α-tocopheryl esters is not a prerequisite for intestinal absorption; they also demonstrate a close correlation between the intestinal hydrolysis of these esters *in vitro* and their absorption into the lymph *in vivo*.

8451 SPECIES DIFFERENCES IN PASSIVE ABSORPTION FROM THE SMALL INTESTINE [Abstract]. (Eng.) Bond, J. H.; Micflikier, A. B.; Levitt, M. D. (Minneapolis Veterans Admin. Hosp., Minneapolis, MN). *Clin. Res.* 24(3):281A; 1976.

8452 EFFECT OF MATERNAL DIET ON IN VITRO INTESTINAL TRANSPORT IN DEVELOPING NEONATAL RATS [Abstract]. (Eng.) Fitzgerald, J. F.; Ferdinandus, L. D. (Indiana Univ. Sch. Medicine, Indianapolis, IN). *Clin. Res.* 24(3):284A; 1976.

8453 CHARACTERIZATION OF BILE ACID BINDING TO BRUSH BORDER MEMBRANES [Abstract]. (Eng.) Wilson, F. A.; Treanor, L. L. (Vanderbilt Univ., Nashville, TN). *Clin. Res.* 24(3):293A; 1976.

8454 VARIATION OF INTERCELLULAR ION COMMUNICATION CHARACTERISTICS IN LIVER CELLS AS A FUNCTION OF TEMPERATURE CHANGES. (Eng.) Jamakosmanovic, A.; Nakas, M. (Dept. Physiology Biochemistry, Medical Faculty, Sarajevo, Yugoslavia). *Folia Med.* 9:107-115; 1974.

8455 CALCIUM UPTAKE OF A RAT LIVER MICROSOMAL SUBCELLULAR FRACTION IN RESPONSE TO IN VIVO ADMINISTRATION OF CARBON TETRACHLORIDE. (Eng.) Moore, L.; Davenport, G. R.; Landon, E. J. (Lab. Molecular Biology, Natl. Cancer Inst., Natl. Inst. Health, Bethesda, MD 20014). *J. Biol. Chem.* 251(4):1197-1201; 1976.

8456 H^+ TRANSPORT IN THE COLON (C) [Abstract]. (Eng.) Chung, R. S.; Johnson, G.; DenBesten, L. (Veterans Admin. Hosp., Iowa City, IA). *Clin. Res.* 24(3):282A; 1976.

8457 MEASUREMENT OF IRON ABSORPTION FROM COMPOSITE MEALS. (Eng.) Bjorn-Rasmussen, E.; Hallberg, L.; Magnusson, B.; Rossander, L.; Svanberg, B.; Arvidsson, B. (Dept. Medicine II, Univ. Goteborg, Sahlgrenska Sjukhuset, Goteborg, Sweden). *Am. J. Clin. Nutr.* 29(7):772-778; 1976.

8458 ROLE OF BILE IN INTESTINAL ABSORPTION OF ^{203}Pb IN RATS. (Eng.) Cikrt, M.; Tichy, M. (Inst. Hygiene and Epidemiology, Srobarova 48, Cs-100 42 Praha 10, Czechoslovakia). *Experientia* 31(11):1320-1321; 1975.

8459 THE EFFECT OF ETHOXYQUIN ON THE INTESTINA TRANSPORT OF GLUCOSE AND WATER IN VITRO [Letter to Editor]. (Eng.) Skaare, J. U. (Dept. Pharmacology Toxicology, Veterinary Coll., Norway, Postbox 8146, Oslo-dep. Oslo 1, Norway). *Acta Phar col. Toxicol.* 38(2):174-176; 1976.

8460 THE SIZE OF GLYCINE OLIGOPEPTIDE WHICH LIMITS INTACT ABSORPTION IN HUMAN JEJUNUM [Abstract]. (Eng.) Adibi, S.; Morse, E. (Montefio Hosp., Pittsburgh, PA). *Clin. Res.* 24(3):431A; 197

8461 DIGESTION AND ABSORPTION OF LIPIDS IN NON RUMINANT AND RUMINANT ANIMALS: A COMPARISON. (Eng.) Harrison, F. A.; Leat, W. M. F. (ARC Inst. Animal Physiology, Babraham, Cambridge CB2 4A England). *Proc. Nutr. Soc.* 34(3):203-210; 1975.

8462 INTESTINAL LIPID ABSORPTION: EVIDENCE FO AN INTRINSIC DEFECT OF CHYLOMICRON SECRETION BY NORMAL RAT DISTAL INTESTINE. (Eng.) Sabes S. M.; Holt, P. R.; Clark, S. B. (Univ. Tennessee Center Health Sciences, Memphis TN 38163). *Lipids* 10(12):840-846; 1975.

8463 PHLORIZIN BINDING PROPERTIES OF BRUSH BORDER MEMBRANES OF RAT INTESTINE [Abstract] (Eng.) Franklin, J. E.; Luk, G.; Isselbacher, K. J (Cornell Medical Coll., New York, NY). *Clin. Res.* 24(3):284A; 1976.

See also, 8760.

54 QUANTITATION OF PHARYNGEAL MOTOR FUNCTION
IN NORMAL HUMAN SUBJECTS. (Eng.) Dodds,
J.; Hogan, W. J.; Lydon, S. B.; Stewart, E. T.;
f, J. J.; Arndorfer, R. C. (Medical Coll. Wiscon-
, Milwaukee, WI 53226). *J. Appl. Physiol.* 39(4):
-696; 1975.

trumentation for recording pharyngeal pressure
nts was evaluated *in vitro* and in seven human
jects, and quantitative values for pharyngeal
istalsis were determined in normal human sub-
ts. For the *in vitro* studies, two polyvinyl
es (1.6 and 2.0 mm in diameter, resp.) were se-
ed to a strain gauge probe, filled with water,
nected to external volume-displacement trans-
ers, and inserted into a pressure wave generator.
unfixed human esophagus, obtained at autopsy,
suspended in the pressure chamber. Pressure
es simulating pharyngeal and esophageal pressure
plexes were generated, and the intraluminal re-
dings were compared with the pressure transients
hin the chamber. In the *in vivo* studies, two
es of recording assemblies were passed through
nose: a motility probe (assembly 1) and an
embly with strain gauge and open-tip catheter
ording sites (assembly 2). The resting upper
phageal sphincter pressure (UESP) and UES relax-
ion and augmentation responses to dry swallowing
e recorded. The results of the *in vitro* studies
icated that accurate quantitation of pharyngeal
or activity was not possible using a water-filled
heter system, even when high infusion rates (24
min) were used. The intraluminal strain gauge
tem, on the other hand, achieved high-fidelity
ording of simulated esophageal pressure com-
exes, although it underestimated simulated pharyn-
al pressure transients by about 10%. Quantitation
pharyngeal peristalsis using the intraluminal
ain gauge system in human subjects revealed peri-
ltic pressure amplitudes higher than those for-
ly recorded. Peristaltic amplitude averaged
ut 200 mm Hg in the hypopharynx, complexes in one
ject being as high as 600 mm Hg. A zone of rela-
ely low pressure was found in the oropharynx.
mean pharyngeal wave duration decreased progres-
ely in an aboral direction, from 1.0 to 0.3 sec,
peristaltic wave speeds ranged between 9 and 25
sec. Accurate quantitation of pharyngeal peri-
ltic variables provides the necessary basis for
characterization and assessment of pharyngeal
or disorders.

55 A NEW TECHNIQUE FOR CONTINUOUS SPHINCTER
PRESSURE MEASUREMENT. (Eng.) Dent, J.
rince Henry's Hosp., Melbourne, Victoria 3004,
stralia). *Gastroenterology* 71(2):263-267; 1976.

cm long pressure sensor that continuously meas-
es maximal lower esophageal sphincter pressure
ESP) in the face of movement of the sphincter with-
the sensor length was developed and compared with
constantly perfused side hole sensor (CPSH) in
, dog, and in a model esophageal sphincter. The
nsor consists of a 5-cm-long thin walled rubber
eeve glued along the catheter. After initial posi-
oning and anchorage, the length of the sleeve is
such that it remains in contact with the sphincter as it moves on the catheter. The sleeve is constantly perfused with water via the proximal end, and the distal end is open to vent the perfusate. Sphincter squeeze acts on the sleeve to cause increased resistance to the flow of water through it. This increased resistance is directly related to the greatest squeeze acting on the sleeve, and causes back pressure to perfusion that is measured as with CPSH. Pull-through studies in the model sphincter demonstrated that sleeve sensitivity was comparable to that of CPSH and that it was acceptably uniform along its length over the pressures tested (5-80 mm Hg). Variation of the length of the artificial sphincter from 1 to 5 cm had an insignificant effect on the pressure recorded by the sleeve compared to the side hole-recorded pressure. In 24 pull-throughs in dogs, LESP did not differ significantly for the two techniques; the mean sleeve pressure was 62.0 mm Hg and CPSH was 59.5 mm Hg. In nine human patients, sequential mean sleeve and CPSH recorded pressures were similar within each individual; the mean sleeve pressure was 10.1 mm Hg and CPSH was 9.7 mm Hg. The LES response to the swallowing of 20 ml of water was a consistent drop in pressure from 16.4 mm Hg to 2.2 mm Hg. The results demonstrate that the sleeve detects maximal LESP accurately, regardless of sphincter length, over the pressure range encountered in the lower esophageal sphincter. Continuous recording of LESP with the sleeve is unaffected by the displacement that causes serious undermeasurement with CPSH.

8466 INSULIN AND JEJUNAL ELECTRICAL ACTIVITY IN DOGS AND SHEEP. (Eng.) Bueno, L.; Ruckebusch, M. (Laboratoire de Physiologie, Ecole Nationale Veterinaire, 31076 Toulouse Cedex, France). *Am. J. Physiol.* 230(6):1538-1544; 1976.

Experiments were designed to test the hypothesis that insulin exerts some influence on the migrating myoelectric complex (MMC) pattern in the intestine and that its postprandial release results in a disruptive factor. Jejunal myoelectric activity was studied in conscious dogs and sheep after either the i.v. injection of exogenous insulin or the stimulation of insulin release. In dogs, the MMC was replaced by a continuous pattern of activity after the injection of insulin (1 U/kg, i.v.) or the infusion of D-glucose, L-leucine, or L-arginine. The response to feeding was reduced in alloxan diabetic dogs and was completely abolished following additional vagotomy when only exogenous insulin induced the "fed" pattern. Vagotomy alone had only minor effects on the response to feeding. Sheep exhibited a continuous sequence of MMC, regardless of feeding, but the infusion of insulin (3 IU/kg) or volatile fatty acids [60 nmol acetic acid (C2), n-butyric acid (C4), or a mixture of C2, propionic acid, or C4 in a molar ratio of 2:1:0.5; 10 ml/min at intervals of 3 days] produced activity similar to that observed after feeding in dogs. In alloxan diabetic sheep, the recurrence and intensity of the MMC were decreased, and the effect of volatile fatty acids was eliminated. The injection of insulin restored the pattern to normal. Thus, insulin levels are important in the control of the jejunal motor profile and may mediate the postprandial disappearance of MMC in dogs.

8467 GASTRIC MYOELECTRICAL ACTIVITY IN MAN. (Eng.) Roze, C. (Laboratoire de Gastroenterologie A Clinique des Maladies de l'Appareil Digestif Hopital Bichat, 75877 Paris Cedex 18, France). *Scand. J. Gastroenterol.* 10(Suppl. 35):54-79; 1975.

Studies on gastric electrical activity in man are summarized. For routine physiological studies in man, the only method available involves the use of a mucosal electrode. The limitations of the use of the electrode include: difficulty in holding the electrode in place for long periods, especially when the stomach is vigorously contracting; the limited area in which electrical activity is conveniently recorded (i.e., the terminal antrum); the inability of the electrode to record spike potentials; and the inability of this method to be used for the determination of the propagation velocity of control activity or the existence of coordination or disorganization of the electrical pattern, because only a single electrode probe has been successfully used. The relationship between gastric control activity and gastric emptying was studied during the emptying of three liquid test meals (350 ml of 150 mM saline, 75 mM HCl made iso-osmolar with NaCl, or 555 mM glucose). The results suggested that gastric control activity was modified during the emptying of the test meals and that the period of pacesetter potentials increased more with slowly emptying meals than with rapidly emptying ones. The infusion of saline (25 ml/min) into the duodenum had no effect, while acid (4 ml/min) induced a progressive increase in the pacesetter potential period, reaching a peak value of 43% above the basal level. A bolus injection of secretin (0.5 U/kg) to fasted subjects induced a consistent increase in the period of pacesetter potentials, which was 35% above the basal level. Although this suggests that hormonal effects are responsible for the effects of duodenal acidification, other studies have negated this. When HCl (0.75 mEq/min) was infused intraduodenally over 4 min in norma subjects, there was a clear increase in the period of gastric pacesetter potentials; when an identical infusion was carried out 20 min later, and followed by an i.v. bolus injection of secretin (0.5 U/kg), the effect was smaller. This increase seen in controls after acid infusion was not seen in patients with duodenal ulcer; however, there was a response to exogenous secretin. The results suggest that in duodenal ulcer patients there is a failure in gastric inhibitory mechanisms, which originates in the duodenum.

8468 COMPARISON OF β-ADRENOCEPTOR BLOCKING PROPERTIES OF SOTALOL, OXPRENOLOL, PROPRANOLOL, AND PINDOLOL ON RABBIT INTESTINAL SMOOTH MUSCLE (Eng.) Salimi, M. (Sch. Veterinary Medicine, Univ. Teheran, Box 3262, Teheran, Iran). *Pharmacology* 13: 441-447; 1975.

8469 ELECTRICAL AND MECHANICAL ACTIVITY OF THE ISOLATED CANINE STOMACH PERFUSED WITH HOMOLOGOUS, IN VITRO, OXYGENATED BLOOD. (Eng.) Kowalewski, K.; Zajac, S. (Surgical-Medical Research Inst., Univ. Alberta, Edmonton, Alberta T6G 2H7, Canada). *Pharmacology* 13:448-457; 1975.

8470 OBSERVATION ON THE ELECTRICAL AND MECHANICAL ACTIVITIES OF THE MONKEY ILEUM IN RELATION TO DRUG ACTIONS. (Eng.) Ohkawa, H.; Watanabe, M. (Yamaguchi Univ. Sch. Medicine, Ube, 755, Japan). *Bull. Yamaguchi Med. Sch.* 22(2):211-217; 1975.

See also, 8497, 8501, 8679, 8682.

LIBRARY U. OF C. [illegible]

SECRETION AND METABOLISM

8471 MICROBIAL MODELS OF MAMMALIAN METABOLISM. (Eng.) Smith, R. V.; Rosazza, J. P. (Coll. Pharmacy, Univ. of Texas at Austin, Austin TX 78712). *J. Pharm. Sci.* 64(11):1737-1759; 1975.

8472 SPECULATION ON THE MECHANISMS OF RELEASE OF GASTROINTESTINAL HORMONES [Abstract]. (Eng.) Scratcherd, T. (Dept. Physiology, Univ. Sheffield, Sheffield, England). *Digestion* 13(1/2):122; 1975.

8473 AMMONIA INTOXICATION: A HAZARD DURING REHABILITATION OF PROTEIN-DERIVED RATS. (Eng.) Stevens, C.; Kennaway, N. C.; Fellman, J. H. (Univ. Oregon Health Sciences Center, Portland, OR 97201). *J. Nutr.* 105(11):1384-1390; 1975.

8474 ASCORBIC ACID IN CHOLESTEROL AND BILE ACID METABOLISM. (Eng.) Ginter, E. (Inst. Human Nutrition, Bratislava 88030, Czechoslovakia). *Ann. N.Y. Acad. Sci.* 258:410-421; 1975.

475 GASTRIN. (Eng.) McGuigan, J. E. (Univ.
Florida Coll. Medicine, Gainesville, FL).
itam. Horm. (N.Y.) 32:47-88; 1974.

476 DIETARY REGULATION OF CARBOHYDRATE METABO-
LIZING ENZYMES: DIFFERENCES IN ADAPTIVE
ESPONSE TO FRUCTOSE OR GLUCOSE FEEDING IN LIVER AND
EJUNAL MUCOSA [Abstract]. (Eng.) Bode, C.; Bode,
. Ch.; Durr, H.-K.; Ohta, W.; Martini, G. A. (Medi-
inische Universitatsklinik, Marburg/Lahn, W. Germa-
y). *Digestion* 12(4/6):252-253; 1975.

477 TEMPORAL RELATIONSHIPS BETWEEN DIETARY,
PLASMA, HEPATIC, AND ADIPOSE TISSUE LIPIDS
FTER SHORT-TERM FEEDING OF SAFFLOWER OIL TO RATS.
Eng.) Dunn, G. D.; Wilcox, H. G.; Heimberg, M.
Vanderbilt Univ. Sch. Medicine, Nashville, TN). *J.
ab. Clin. Med.* 86(3):369-377; 1975.

8478 EFFECT OF WHEAT FIBER ON BLOOD LIPIDS, FECAL STEROID EXCRETION AND SERUM IRON. (Eng.) Jenkins, D. J. A.; Hill, M. S.; Cummings, J. H. (Central Middlesex Hosp., Action Lane, London N.W. 10, England). *Am. J. Clin. Nutr.* 28(12):1408-1411; 1975.

See also, 8424, 8461.

SECRETION AND METABOLISM

Stomach

479 TUBAL SMALL INTESTINAL NUTRITION. (Rus.)
Shchedrunov, V. V. (Dept Therapy No. 12
or Postgraduate Training of Physicians, S. M. Kirov
ilitary Medical Academy, Leningrad). *Klin. Med.
Mosk.)* 53(5):132-135; 1975.

he therapeutic effectiveness and the effect on
astric secretion of intrajejunal drop feeding were
tudied in 143 patients with gastric ulcer and in
5 patients with duodenal ulcer. Group 1 (102 pa-
ients) received milk (1,000 ml), sour cream (100 g),
eggs, butter (25 g), sugar (160 g), protein hydro-
yzate (500-1,000 g), grape juice (500 ml), and,
n some cases, alcohol (50 g). Group 2 (76 patients)
eceived an emulsified mixture of dried milk (125 g),
ried skim milk (75 g), egg powder (50 g), sugar
90 g), and sunflower-seed oil (30 g). The gastric
ecretory response was lowest, and the production of
ancreatic juice and the activity of the proteolytic
nzymes were highest in group 2. The emulsion was
ell tolerated by the patients, and it promoted the
ormalization of some indices of protein and fatty
etabolism. The incidence of gastric and intestinal
yspepsia was higher in group 1 than in group 2.
ube feeding resulted in the cessation of pain in all
atients, which recurred in only four after the
ube feeding. Cicatrization of the ulcer was achieved
n 46.5% of the patients; this rate increased to
1.4% after adjuvant L-dopa treatment and to 65.5%
fter intestinal administration of a mixture of
rocaine hydrochloride, atropine, and metacin.

480 ISOLATION OF PARIETAL CELLS FROM GUINEA-
PIG GASTRIC MUCOSA AND THE IMMUNOLOGICAL
HARACTERIZATION OF THEIR ANTIGENIC STRUCTURE. (Eng.)
Jewell, D. P.; Katiyar, V. N.; Rees, C.; Taylor, K. B.; Wright, J. P. (Dept. Medicine, The Royal Free Hosp., Pond St., London, NW3 2QG, England). *Gut* 16(8):603-612; 1975.

Parietal cells were isolated from the Hartley guinea pig gastric mucosa by enzymatic digestion with collagenase. An *in vivo* perfusion with collagenase was not successful, and isolation was attempted by incubating fresh mucosa with collagenase (0.05%) *in vitro*. The cells were harvested by centrifugation and identified by phase-contrast microscopy, electron microscopy, immunofluorescence, and their ability to take up neutral red. Carbonic anhydrase and pepsin activities were also measured in the isolated cells and in the mucosal fragments from which they had been isolated. Rabbits were immunized with whole parietal cells, homogenized cells, the cell membranes from parietal cells, and soluble protein from the body of the guinea pig stomach. Antibody production was then determined by immunofluorescence, complement fixation, immunoelectrophoresis, and immunodiffusion. The *in vitro* technique yielded a suspension that contained 70%-80% parietal cells. About 80% of the cells were viable immediately after incubation, but viability dropped sharply after 1 hr. Antibodies to four distinct parietal cell antigens were obtained from rabbits immunized with the isolated parietal cells or fractions thereof. These antibodies were directed against the microsomal fraction of the parietal cell cytoplasm, the plasma and nuclear membranes, the soluble proteins, and Castle's intrinsic factor. The antibody against the microsomal fraction reacted in the same way as the antibody to parietal cell canaliculi found in the serum of patients with pernicious anemia, but it showed greater species-specificity. Preliminary studies of absorption with human, hog, and frog *(Rana catesbiana)* gastric microsomal preparations suggest that both pernicious anemia sera and rabbit antisera to guinea pig parietal cells contain a heterologous antibody to frog parietal cell cytoplasm.

8481 SOME MINIMAL EFFECTS OF BILE ACID ON CANINE GASTRIC MUCOSA IN HEIDENHAIN POUCHES.

(Eng.) Rees, W. D. W.; Rhodes, J.; Wheeler, M. H.; Meek, E. M.; Bartholomew, C.; Newcombe, R. G. (Univ. Hosp. Wales, Heath Park, Cardiff, Wales CF4 4XW). *Am. J. Dig. Dis.* 21(8):645-648; 1976.

Changes in the volume, concentration, and fluxes of sodium and hydrogen ions were measured in the gastric mucosa of Heidenhain pouches in four dogs before and during exposure to a concentration of taurocholate that was just sufficient to produce consistent changes. The results were examined to identify those changes that are the most sensitive indicators of bile damage. In periods 1 and 2 of the experiment (30 min each), a control standard acid solution containing 100 mM HCl was placed in the pouches, and changes in volume and ionic concentrations were determined. In period 3 (30 min), a solution of sodium taurocholate containing the same hydrogen ion concentration was used. The concentration of taurocholate used in each dog was determined by a series of preliminary experiments in which the concentration of taurocholate was increased until the results in period 3 differed consistently from the control periods. The concentrations used were 12, 20, 16, and 10 mM, resp. With sodium taurocholate in the pouch, the volume of fluid increased (mean 1.2 ml); associated with this were a marked and consistent fall in the hydrogen ion concentration (mean 4.7 µmol/ml) and an increase in the sodium ion concentration (3.7 µmol/ml). There was an increased flux of hydrogen ion from the pouch (mean 181 µmol/30 min) and of sodium into the pouch (mean 199 µmol/30 min). All changes were significantly different from the control periods. The change in volume in period 3 compared with period 2 was consistently positive and was approximately 1 ml in each dog. The ratio between bile/control value (for period 2) in ion flux was 1.6. The ratios for hydrogen ion concentration, sodium ion concentration, and sodium ion flux were all similar: 3.6, 3.4, and 4.1, resp. An analysis of individual results revealed that bile produced consistent changes in all parameters in all of 16 experiments. The change in hydrogen ion flux, however, was less consistent; in four experiments with different dogs, the change was not statistically significant. The results show that the hydrogen ion flux is the least sensitive indicator of minimal damage to the mucosal barrier.

8482 MODIFICATION OF THE GASTRIC SECRETORY RESPONSE TO SHAM FEEDING BY ACIDIFICATION OF THE ANTRUM AND THE DUODENUM IN DOGS.

(Eng.) Sjodin, L. (Dept. Pharmacology, Karolinska Institutet, Stockholm, Sweden). *Acta Physiol. Scand.* 96 (2):250-255; 1976.

The effect of closure of a gastric cannula on the
acid response to sham feeding was studied in Pavlo
pouch dogs with intact antro-duodenal regions, as
well as in antrectomized dogs with gastroduodenostomies. In the latter, the sham feeding response
was augmented by infusions of low doses of exogeno
gastrin (0.15 or 0.30 µg/kg/hr). Closure of the
gastric cannula resulted in a decreased acid respo
to 10 min of sham feeding in the four dogs tested
before antrectomy. The reduction in 3-hr acid output ranged between 39 and 71%. The reduction was
statistically significant ($p<0.05$) in at least one
1-hr period in all dogs. After antrectomy, the do
responded only weakly to sham feeding alone (dog A
0.68 ± 0.37; B, 0.92 ± 0.33; and C, 0.06 ± 0.06 mE
3 hr). When a threshold dose of gastrin was admin
tered as a background stimulus, the acid response
to sham feeding was substantial. This response wa
not reduced in any of three dogs by closure of the
gastric cannula and tended to increase the secreti
evoked by sham feeding. The secretin of pepsin
after sham feeding was not consistently affected b
closure of the gastric cannula. The changes in 3-hr output varied from an increase of 36% to a 66%
decrease. After antrectomy, there was again no
consistent difference in the pepsin response to sh
feeding between experiments with open ended and cl
gastric cannula. The results suggest that the
observed hypersecretory response to sham feeding
after diversion of gastric acid from antrum and
duodenum is mainly due to inactivation of antral
inhibitory mechanisms. The pepsin secretion follo
ing sham feeding was not consistently changed by
closure of the gastric cannula.

8483 INFLUENCE OF THE POSITION OF THE SIDE C HYDROXY GROUP ON THE GASTRIC ANTISECRET AND ANTIULCER ACTIONS OF E$_1$ PROSTAGLANDIN ANALOGS.

(Eng.) Dajani, E. Z.; Driskill, D. R.; Bianchi,
G.; Collins, P. W.; Pappo, R. (Searle Labs., P.O.
Box 5110, Chicago, IL 60680). *Prostaglandins* 10(
733-745; 1975.

Two synthetic prostaglandins (PG) were prepared a
compared with prostaglandin E$_1$ methyl ester (PGE$_1$
for their gastric antisecretory and antiulcer pro
ties in laboratory animals. The compounds were (
15-deoxy-16α, β-hydroxy PGE$_1$ methyl ester (SC-289
and (±)-15-deoxy-17α, β-hydroxy PGE$_1$ methyl ester
(SC-30693). Both SC-28904 and PGE$_1$ME, at a bolus
dose of 10 µg/kg, significantly inhibited steady-
gastric secretion in dogs with Heidenhain pouches.
PGE$_1$ME was significantly more potent only during
first interval, but SC-28904 was considerably lon
acting (120 min, compared to 90 min). Electrolyt
composition of the gastric fluid was not affected
this concentration. At 30 µg/kg, a significantly
greater inhibition of steady-state gastric secret
was effected. The two agents were equipotent, bu
28904 was longer acting (3 hr as compared to 2 hr
at the higher concentration. Both agents caused
increase in the sodium concentration of the gastr
juice and a decrease in hydrogen ion. At 1 mg/kg
SC-20693 was totally inactive. Intragastric bolu
administration of SC-28903 (300-1,000 µg/kg) to d
with gastric fistulae significantly reduced hista-

e-stimulated gastric secretion, but 100 µg/kg
ineffective. Intragastric administration of
$_1$ME (1 mg/kg) was totally ineffective in reducing
tric secretion in response to histamine and was
ociated with extensive biliary reflux, vomiting,
emesis. The incidence and severity of side
ects after i.v. PGE$_1$ME were much greater than
se observed after SC-28904. Intragastric adminis-
tion of SC-28904 at 300-1,000 µg/kg was only
asionally and briefly associated with side-effects.
antiulcer studies, forced muscular exercise
duced deep glandular mucosal ulceration and bleed-
; in all 78 control rats. S.c. administration of
her SC-28904 or PGE$_1$ME resulted in a dose-dependent
ibition of ulcer formation. In these studies,
-30693 was totally inactive, even at 5.0 mg/kg,
ch was 10 times greater than the minimal effective
se for SC-28904 or PGE$_1$ME. It is concluded that
e of the receptor sites for the PGE$_1$ molecule
ld easily accomodate the side chain hydroxy group
either the C$_{15}$ or C$_{16}$ position. The hydroxy
up in the latter position significantly improved
biological activity of PGE$_1$ME.

34 EXAMINATION OF STOMACH WALL Mg^{2+}-Na$^+$-K$^+$-
DEPENDENT ATPase, ATP, AND ADP IN PYLORUS-
GATED RATS. (Eng.) Mozsik, G.; Vizi, F. (First
pt. Medicine, Univ. Medical Sch., H-7643 Pecs,
ngary). *Am. J. Dig. Dis.* 21(8):649-654; 1976.

stomach wall contents of Mg^{++}-Na$^+$-K$^+$-dependent
Pase, ATP, and ADP were determined in rats at
7, 17, and 24 hr after ligation of the pylorus
release the H$^+$ secretion and ulcer development.
cer development was first observed at 17 hr and
s sharply increased by 24 hr. The peak of gastric
id secretion was reached by 7 hr after ligation,
ile the gastric secretory volume increased steadi-
throughout the 24 hr. Cation-dependent ATPase
tivity in the stomach wall from both the fore-
omach and the corpus plus antrum was markedly
creased at 4 and 7 hr and was significantly de-
eased at 24 hr. In both the forestomach and the
rpus plus antrum, the stomach wall ATP content
s markedly reduced at 4 hr, showed a rise at 7 hr,
d decreased thereafter. Changes in the stomach
ll ADP content paralleled those of ATP, but were
ch smaller. The peak of ouabain (0.25 mg, s.c.,
mediately after ligation) inhibition on gastric
tion-dependent ATPase activity was found at 4 hr
ter ligation in both the forestomach and the cor-
s plus antrum. Ouabain also inhibited gastric
id secretion and the development of ulcers. It is
ggested that H$^+$ secretion depends primarily on
eakdown of ATP, while ulcer development depends on
e exhaustion of ATP resynthesis.

85 SECRETORY FUNCTION OF THE STOMACH OF JAPAN-
ESE WITH ENDOSCOPICALLY NORMAL GASTRIC MUCO-
. (Eng.) Yamagata, S.; Ishimori, A.; Sato, H.;
shihara, K.; Masuda, M.; Kasugai, T.; Yoshitoshi,
.; Takahashi, T.; Wada, T. (Tohoku Univ. Sch. Medi-
ine, 1-1 Seiryo-machi, 980 Sendai, Japan). *Gastro-*
nterol. Jpn. 10(2):162-167; 1975.

8486 QUANTITATION OF G-CELLS IN FIBREOPTIC BIOPSY SPECIMENS AND SERUM GASTRIN LEVELS IN HEALTHY NORMAL SUBJECTS. (Eng.) Piris, J.; Whitehead, R. (Dept. Pathology, Radcliffe Infirmary, Oxford, England). *J. Clin. Pathol.* 28(8):636-638; 1975.

8487 SOME ASPECTS OF THE INTESTINAL CONTROL OF GASTRIN SECRETION IN DOGS [Abstract]. (Eng.) De Graef, J.; Woussen-Colle, M. C.; Limbosch, J. M.; Brihaye, Cl. (No affiliation given). *Acta Hepatogastroenterol. (Stuttg.)* 22(6):420-421; 1975.

8488 THE SIGNIFICANCE OF INTRAMURAL REFLEXES UPON ACID SECRETION INDUCED BY ENDOGENOUS GASTRIN AFTER FEEDING IN THE POUCH DOG [Abstract]. (Eng.) Holle, F.; Bauer, H.; Arnold, R.; Creutzfeldt, W. (No affiliation given). *Acta Hepatogastroenterol. (Stuttg.)* 22(6):419-420; 1975.

8489 EFFECT OF BILATERAL NEPHRECTOMY ON SERUM GASTRIN CONCENTRATION, GASTRIC HISTAMINE CONTENT, HISTIDINE DECARBOXYLASE ACTIVITY AND ACID SECRETION IN THE RAT [Abstract]. (Eng.) Hakanson, R.; El Munshid, H. A.; Liedberg, G.; Rehfeld, J. F.; Sundler, F.; Larsson, L.-I. (Dept. Pharmacology, Univ. Lund, Lund, Sweden). *Agents Actions* 5(5):456; 1975.

8490 ISOLATED PARIETAL CELL MODEL FROM RAT GASTRIC MUCOSA FOR THE STUDY OF H$^+$ SECRETION [Abstract]. (Eng.) Lewin, M.; Bonfils, S. (INSERM U-10, Hopital Bichat, Paris, France). *Digestion* 13(1/2):115; 1975.

8491 STUDIES ON GASTRIC PEPSIN SECRETION [Abstract]. (Eng.) Moriga, M.; Inagawa, T. (Kyoto Univ. Hosp., Kyoto, Japan). *Gastroenterol. Jpn.* 10(3):230; 1975.

8492 PROTEIN SYNTHESIS AND THE cAMP SYSTEM IN THE RESTING AND STIMULATED GASTRIC MUCOSA OF RATS [Abstract]. (Eng.) Sewing, K.-F.; Ruoff, H.-J. (Dept. Pharmacology, Univ. Tubingen, Tubingen, W. Germany). *Digestion* 13(1/2):123; 1975.

8493 EFFECT OF SOME STIMULANT DRUGS ON GASTRIC ACID SECRETION OF THE ISOLATED GUINEA-PIG STOMACH [Abstract]. (Eng.) Impicciatore, M.; Morini, G.; Bertaccini, G. (Istituto di Farmacologia dell' Universita, Parma, Italy). *Rend. Gastroenterol.* 7 (3):238; 1975.

8494 HISTOCHEMICAL STUDIES ON THE INFLUENCE OF EXPERIMENTAL VAGOTOMY ON EPITHELIAL MUCOUS SUBSTANCES IN THE STOMACH AND JEJUNUM OF WHITE RATS. (Eng.) Wesolowski, H.; Snop, S. (Inst. Biostructure, Pomeranian Medical Acad., Szczecin, Poland). *Folia Morphol. (Warsz.)* 35(1):7-14; 1975.

8495 GASTRIC IRRIGATION AND SECRETION IN RATS WITH PYLORUS LIGATURE OR FISTULA AFTER THE INFLUENCE OF INTRADUODENAL OLIVE OIL. (Fre.) De Saint Blanquat, G.; Fritsch, P.; Derache, R. (INSERM U-81, Institut de Physiologie, 2 Rue Francois Magendie, F-31400 Toulouse, France). *Experientia* 31(12): 1432-1434; 1975.

See also, 8604, 8623, 8642, 8753.

SECRETION AND METABOLISM

Pancreas

8496 INHIBITORY ACTION OF ANTIDIURETIC HORMONE ON CANINE PANCREATIC EXOCRINE FLOW. (Eng.) Schapiro, H. (Eastern Virginia Medical Sch., Norfolk, VA 23507). *Am. J. Dig. Dis.* 20(9):853-857; 1975.

The effects of various antidiuretic hormone (ADH) preparations on pancreatic exocrine secretion and of minimal effective concentrations of ADH on pancreatic exocrine flow were studied in 14 fasted dogs with pancreatic fistulas. Pancreatic flow in anesthetized and conscious animals was stimulated by i.v. secretin (0.02 U/kg/min). ADH (Pitressin or Octapressin) was injected i.v. (1.0-5.0 mU/kg), and the pancreatic volume was measured at 5- to 10-min intervals. In some dogs, the minor pancreatic duct was ligated and the major duct was cannulated prior to secretin administration. After the ADH experiments, desamino-cys-1-8-D-arginine (5.0-600.0 ng/kg) was administered to the anesthetized dogs, and the effects on exocrine pancreatic flow were monitored. In both the anesthetized and conscious dogs, there was a correlation between the percentage inhibition of secretin-stimulated pancreatic exocrine flow and the amount of Pitressin administered; the minimal effective concentration was 1.0 mU ADH/kg or 0.016 mU ADH/ml blood. Sodium pentobarbital anesthesia greatly reduced the effects of secretin on pancreatic exocrine flow. The inhibitory effects of Octapressin on secretin-stimulated pancreatic exocrine secretion were greater and longer-lasting than those of Pitressin. The minimal effective dosage of Octapressin was 0.75 mU/kg or 0.012 mU/ml blood. Desamino-cys-1-8-D-arginine had no effect on the pancreatic exocrine flow in the anesthetized dogs. The data appear to demonstrate a correlation between the inhibitory action of ADH on the exocrine pancreas and the molecular configuration of the hormone.

8497 INHIBITION BY SOMATOSTATIN OF PANCREATIC JUICE AND ENZYME SECRETION AND GALLBLADDER CONTRACTION IN MAN INDUCED BY SECRETIN AND CHOLECYSTOKININ-PANCREOZYMIN. (Ger.) Creutzfeldt, W.; Lankisch, P. G.; Folsch, U. R. (Medizinische Universitatsklinik, 34 Gottingen, Humboldtallee 1, W. Germany). *Dtsch. Med. Wochenschr.* 100(20):1135-1138; 1975.

The effect of somatostatin on exogenously stimulat pancreatic secretion and gallbladder contraction w analyzed. Five healthy male volunteers received somatostatin (SS) at a rate of 200 μg/hr in a 2-hr infusion, after a bolus injection of 200 μg/hr. Secretin (0.33 U/kg) was administered i.v. 30 min after the beginning and end of the infusion. Chol cystokinin-pancreozymin (CCK-PZ) replaced secretin under the same conditions in the same subjects 7 days later. Assay of duodenal secretion showed a reduction of 44% of the basal volume, 30% of the bicarbonate output (but a 23% increase of the bica bonate concentration), 44% of amylase output, and 73% of trypsin secretion following SS suppression of secretin stimulation. SS inhibition of CCK-PZ stimulation was 61% of the basal volume, 58% of amylase output, 91% of trypsin output, and 93% of bilirubin. Pancreatic response to CCK-PZ 30 min after suspending SS showed a sharp increase in secretory volume and enzyme output. This was simu taneous with a significant increase in bilirubin concentration, indicating renewal of gallbladder contraction. There was also a complete arrest of gastric juice production, but blood sugar remained unaffected. There were no subjective side-effects SS is believed to inhibit the liberation of secret granules from endocrine cells, enzyme granules fro exocrine cells, acid from parietal cells, and the secretion of fluid from epithelial cells.

8498 FURTHER EVIDENCE THAT PROTEIN SYNTHESIS CAN BE DECREASED IN VIVO FOLLOWING HORMONAL STIMULATION IN THE RAT PANCREAS. (Eng.) Mongeau, R.; Dagorn, J. C.; Morisset, J. (Unite de Recherche Gastro-intestinale, Faculte des Sciences Universite de Sherbrooke, Sherbrooke, Quebec, Canada J1K 2R1). *Can. J. Physiol. Pharmacol.* 54(3 305-313; 1976.

The influence of exocrine secretory stimulation on pancreatic protein synthesis was investigated *in vivo* in male albino Sprague-Dawley rats. The stimulant consisted of a single injection of cholecys-

okinin pancreozymin (8 Ivy U/kg) plus secretin
5 clinical U/kg). The rate of ^{14}C-phenylala-
ine incorporation into total proteins was measured
, 11, 17, 30, 45, and 60 min later. Incorporation
as decreased by 34% ($p<0.001$) after 5 min, then
ncreased by 37% ($p<0.05$) at 17 min, and finally
eturned to control values at 45 min. This biphasic
volution was shown not to be caused by variations
n the precursor pool specific radioactivity. It
s concluded that secretory stimulation of the
ancreas can induce a decrease in the rate of pro-
ein biosynthesis. This decrease is a transient
henomenon, since the rate of biosynthesis was
ncreased at 17 min. These results, obtained from
totally *in vivo* system, confirm previous data
btained from an *in vivo-in vitro* system.

499 INTERACTION OF PORCINE VASOACTIVE INTES-
TINAL PEPTIDE WITH DISPERSED PANCREATIC
CINAR CELLS FROM THE GUINEA PIG: BINDING OF RADIO-
ODINATED PEPTIDE. (Eng.) Christophe, J. P.;
enlon, T. P.; Gardner, J. D. (Univ. Brussels
edical Sch., 1000 Brussels, Belgium). *J. Biol.
hem.* 251(15):4629-4634; 1976.

he kinetics, stoichiometry, and chemical specificity
f the binding of ^{125}I-labeled vasoactive intestinal
eptide (VIP) to dispersed acinar cells of guinea
ig pancreas are reported. Binding was half-maximal
ithin 5 min, and maximal at 10-20 min. It progres-
ively decreased with decrements in temperature from
7 C to 4 C. Binding was maximal at pH 7.0-7.5.
he addition of nonradioactive VIP (5×10^{-7} M) did
ot affect the rate of dissociation, but a reduction
n temperature did reduce the rate of dissociation.
he VIP was 94-97% precipitable by 5% trichloracetic
cid (TCA), and this was reduced by 15% after incuba-
ion for 30 min without acinar cells. In the pre-
ence of acinar cells, the rate of loss of TCA-pre-
ipitability increased two- to threefold, and non-
abeled VIP, bacitracin, or aprotinin did not pro-
ect against this loss. Increasing the concentration
f bovine serum albumin from 0.1% to 4% did increase
he TCA-precipitable VIP after 30 min from 69 to
3%. Following incubation of VIP with acinar cells,
he amount of free VIP in the incubation medium
hich could bind to fresh acinar cells diminished
rogressively with time at a rate more rapid than
he loss of TCA-precipitability. This deterioration
n biological activity was reduced when the tempera-
ure was lowered to 15 C. When bound VIP was
emoved from the acinar cells and reincubated with
resh acinar cells, it had significantly greater
iological activity than the free VIP from the same
ncubation mixture. Inhibition of binding of ^{125}I-
IP by native VIP was detected at 10^{-10} M VIP, half-
aximal at 10^{-9} M VIP, and complete at 10^{-6} M VIP.
he dose-response curves for inhibition of binding
y nonlabeled VIP and by secretin was biphasic and
uggested two classes of binding sites on the acinar
ells: a relatively small number of sites (9,000
er cell) with a high affinity for VIP and a low
ffinity for secretin; and a larger number of sites
135,000 per cell) with a low affinity for VIP and
high affinity for secretin. Since synthetic COOH-
erminal fragments VIP$_{14-28}$, VIP$_{15-28}$, and secretin$_{14-27}$ were equipotent in inhibiting binding, it is concluded that the difference between the relative affinities of VIP and secretin for the high affinity binding sites is primarily attributable to the NH$_2$ terminal portions of the molecules. Secretin$_{5-27}$, (6-tyrosine) secretin, and native secretin were equipotent in inhibiting VIP binding to its high affinity site, and were five times more potent than secretin$_{14-27}$, but 10,000 times less potent than native VIP.

8500 IV. STUDIES OF FOUR DIFFERENT MEALS. (Eng.) Johansson, C. (No affiliation given). *Mt. Sinai J. Med. N.Y.* 43:35-36; 1976.

8501 VIII. OUTPUT OF PANCREATIC ENZYMES AND OF BILIRUBIN AND THEIR RELATION TO GASTRIC EMPTYING OF DIFFERENT TEST MEALS. (Eng.) Ekelund, K.; Johansson, C. (No affiliation given). *Mt. Sinai J. Med. N.Y.* 43:68-72; 1976.

8502 BICARBONATE SECRETION BY THE PANCREAS OF THE ANAESTHETIZED RAT [Abstract]. (Eng.) Sewell, W. A.; Coroneo, M.; Young, J. A. (Dept. Physiology, Univ. Sydney, Sydney, N.S.W., Australia). *Digestion* 13(1/2):123; 1975.

8503 CALCIUM BINDING TO CELLULAR MEMBRANES OF THE EXOCRINE PANCREAS OF THE GUINEA PIG [Abstract]. (Eng.) Meldolesi, J.; Ramellini, G. (Dept. Pharmacology, Univ. Milan, Milan, Italy). *Digestion* 13(1/2):118; 1975.

8504 COMPARISON OF THE EFFECTS OF CARBACHOL AND THE IONOPHORE A23187 ON ENZYME SECRETION AND CALCIUM MOVEMENTS IN RABBIT PANCREAS [Abstract]. (Eng.) Schreurs, V. V. A. M.; Swarts, H. G. P.; de Pont, J. J. H. H. M.; Bonting, S. L. (Dept. Biochemistry, Univ. Nijmegen, Nijmegen, Netherlands). *Digestion* 13(1/2):124-125; 1975.

8505 Ca^{++} COUPLING IN THE EXOCRINE PANCREAS [Abstract]. (Eng.) Schultz, I.; Kondo, S.; Milutinovic, S.; Sachs, G. (Max-Planck-Institut fur Biophysik, Frankfurt a.M., W. Germany). *Digestion* 13(1/2):125; 1975.

8506 ROLE OF CYCLIC NUCLEOTIDES IN PANCREAS ENZYME AND ELECTROLYTE SECRETION [Abstract]. (Eng.) Robberecht, P. (Laboratoire de Chimie biologique, Universite Libre de Bruxelles, Bruxelles, Belgium). *Digestion* 13(1/2):121; 1975.

8507 THE INVOLVEMENT OF THE MICROFILAMENTOUS SYSTEM IN THE EXOCYTOSIS OF THE PANCREATIC ZYMOGEN GRANULES [Abstract]. (Eng.) Stock, C.; Vincent, D.; Bauduin, H. (INSERM U-61, Strasbourg, France). *Digestion* 13(1/2):125-126; 1975.

8508 EXPERIMENTAL STUDIES ON THE PATHOPHYSIOLOGICAL CHANGES IN THE PANCREAS OF RAT FOLLOWING BILATERAL LIGATION OF THE PAROTID GLAND DUCT. (Eng.) Kakizaki, G.; Sasahara, M.; Saito, T.; Soeno, T.; Fujiwara, Y.; Nihei, T.; Ishidate, T.; Senoo, A. (Akita Univ. Sch. Medicine, Akita, Japan). *Tohoku J. Exp. Med.* 118(4):331-348; 1976.

8509 THE EFFECTS OF PANCREATIC JUICE AND ASCITES FLUID FORMED DURING PANCREATITIS ON CAPILLARY PERMEABILITY [Abstract]. (Eng.) Appert H. E.; Lee, P. C.; Howard, J. M. (Medical Coll. Oh Toledo, OH 43614). *Fed. Proc.* 35(3):540; 1976.

See also, 8426, 8449, 8479, 8525, 8589.

SECRETION AND METABOLISM

Hepatobiliary Tract

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8510 A NOVEL METHOD FOR RELIABLE LONG-TERM CANNULATION OF THE COMMON BILE DUCT IN DOGS. (Ger.) Dinstl, K.; Lehr, L.; Schiessel, R. (I. Chirurg. Univ. Klinik, Alser Str. 4, A-1090 Wien, Austria). *Res. Exp. Med.* 165(3):297-300; 1975.

A new method of bile drainage or measurement in which the instrumentation can remain in place for several months is reported. The method was tested in nine dogs. After median laparotomy, cholecystectomy, presentation of the ductus choledochus, and location of the hepaticus bifurcation, a siliconized T-drain was inserted and pulled through a Thomas cannula in the abdominal wall below the right rib cage. To avoid intestinal prolapse the interior cannula opening was covered with parietal peritoneum. There was no postoperative mortality. There was one infection of the cannula bed and two subcutaneous cannular prolapses, all of which were corrigible. The duration of cannulation was 2-9 months. Bile removal did not discomfit the animals and can be performed several times daily. The drain can be washed once monthly with sterile salt solution, and the cannular cavity can easily be sprayed with antibiotic.

8511 PROTECTION OF THE HEPATIC PARENCHYMA. (Ger.) Orzechowski, G. (5 Koln 91, Wiehlerstrasse 7, W. Germany). *Z. Ther.* 12(1):1-13; 1974.

Cell structure and function is reviewed, and the role of external and internal membranes in maintaining hepatocyte integrity is examined. Cell organelles were described, to illustrate how each can be construed as a series of interlocking interfaces making up the intracellular continuum. Particular stress was given to the inter-relation of membrane and enzyme and the mechanism of liver enzyme liberation to the serum. Various theories of membrane composition were examined to explain the transit o nonlipid protein structures across lipid barriers. The reversible effect of steroids on the permeabil ty of limiting cell membranes, such as the cortiso induced whitewash effect in icterus, was recalled. The type and extent of free radical attack on membranes was exemplified by carbon tetrachloride. The special reactivity of free radicals with methy ene bridges surrounding double bonds in unsaturate fatty acids was used to show free radical shift an the resultant chain reaction, leading ultimately t hydrophilic pore formation and the escape of intra cellular enzymes. Extensive coverage was devoted to silymarin and its antioxidant activity in parti ular as it protects against D-galactosamine injury, which, in the opinion of some, comes close to viral hepatitis infection in humans. Compartmentalization of lipid-soluble water-soluble compo nents received confirmation from the behavior of microsomal mixed function oxidases, which improve the water solubility of xenobiotics by introducing hydroxyl groups. In general, parenchymal protecti is synonymous with membrane protection.

8512 STUDIES ON CYTOCHROME P-450-LINKED FUNCTIONS IN ISOLATED RAT LIVER CELLS. (Eng Orrenius, S.; Moldeus, P.; Vadi, H.; Grundin, R. (Dept. Forensic Medicine, Karolinska Institutet, S-104 01 Stockholm 60, Sweden). *Biochem. Soc. Trans.* 3(6):817-820; 1975.

Studies on drug uptake, regulation of drug metabolism, and formation and excretion of drug metabolites in isolated rat liver cells are reviewed. T rat liver cells were isolated by collagenase perfusion. In the isolated liver microsomal fraction cytochrome P-450 is present in the oxidized state, and the major part appears to be free of bound endogenous substrate; this seems to be also true wit isolated rat liver cells. Thus, the addition of various drug substrates to the medium causes the

pearance of the type I spectral change indicative
the formation of the cytochrome P-450-substrate
mplex. At a temperature compatible with metabo-
sm, the type I spectral change produced on the
dition of drugs, such as alprenolol or nortripty-
ne, to a suspension of rat liver cells is often
llowed by the appearance of an absorption peak at
7 nm that then rapidly disappears. This spectral
ange is in turn followed by another transient in-
ease in absorption at about 446 nm. The occur-
nce and short duration of these absorption peaks
ring the early phase of drug mono-oxygenation sug-
st that they may reflect different states of cyto-
rome P-450 during the mono-oxygenation reaction.
e mono-oxygenation of various substrates with iso-
ted rat liver cells is as fast as, or faster than,
at with the isolated liver microsomal fraction
pplemented with an NADPH-generating system. With
l tested substrates, both experimental models have
sponded similarly to inhibitors, such as diethyl-
inoethyl 2,2-diphenylvalerate and 2-methyl-1,2-
pyrid-3-ylpropan-1-one, and to pretreatment of the
imals with inducers, such as phenobarbital or 3-
thylcholanthrene. In studies with isolated liver
crosomal fractions, NADH affects microsomal mono-
ygenase reactions, stimulating drug metabolism in
nergism with NADPH. This may be due to increased
patic reduction level leading to increased produc-
on of NADPH, transfer of electrons from reduced
tochrome b_5 to the reduced oxygenated substrate-
und cytochrome P-450 complex, or simply a de-
eased flow of electrons from NADPH-cytochrome P-450
ductase to cytochrome b_5. Whether a glucuronide or
sulfate is formed when drug metabolites are hy-
oxylated seems to be dependent on substrate con-
ntration, as well as on the availability of uri-
ne diphosphate-glucuronic acid and ATP-5'-sulphato-
osphate. The results of these experiments suggest
at isolated liver cells seem to retain many prop-
ties of the intact tissue, which makes them suit-
le for cytochrome P-450-linked functions that can-
t be easily investigated with other experimental
stems.

13 INHIBITORY AND ANTI-INHIBITORY FACTORS OF RAT SERUM ACTIVE ON THE G_1-S TRANSITION OF PATOCYTE CELL CYCLE.

(Eng.) Nadal, C.; Boffa, G.
(Unite de Physiologie Cellulaire INSERM, Institut
Radium, 91405-Orsay, France). *Cell Tissue Kinet.*
4):297-205; 1975.

e factors regulating hepatic cell multiplication
vivo were localized by fractionation of the serum
oteins of normal and two-thirds hepatectomized
star rats. Rat pups (8-10 days old) were inocula-
d s.c. with 0.4 ml of casein solution (3.5 g in 3%
ueous NaOH). Twelve hours later, during the late
phase in the casein-synchronized hepatocytes, the
imals received s.c. injections of 0.15 M NaCl
.5 or 0.8 ml), normal or hepatectomized adult rat
rum (0.8 ml), various rat serum protein fractions
.5 ml), or a second dose of casein (0.4 ml).
ring the S phase, 4 hr later, the synchronized
patocytes were labeled by an i.p. injection of
-6-thymidine (1 µCi/g). The percentage of labeled
patocyte nuclei and of binucleated hepatocytes
among labeled daughter cells was determined 40 hr after the first casein injection. The injection of normal adult rat serum in late G_1 produced a constant reduction in the percentage of labeled hepatocyte nuclei, reflecting inhibition of the progression from G_1 to S, and an increase in the percentage of binucleate hepatocytes. The activity of the various serum fractions indicated that the effect of the crude serum was linked to proteins having a high electronegative charge and high molecular weight. Polyacrylamide gel electrophoresis showed that the main component of the active fraction was α_1-macroglobulin. Hepatectomized rat serum had no inhibiting activity and did not induce binucleate cell formation. However, two components with antagonistic activities (an α_1-globulin and a γ-globulin) were separated chromatographically from this serum. The α_1-globulin had a lower molecular weight than that of normal rats, and only male rat pups were responsive to it. The γ-globulin factor was antagonistic to the α_1-globulin factor, although a similar fraction from normal rat serum had no such antagonistic activity. The existence in adult rat serum of a factor inhibiting hepatocyte multiplication and of an occasional antagonist suggests a control mechanism similar to that observed in systems regulated by tissue-specific inhibitors of the chalones.

8514 DRUG METABOLIZING FUNCTION OF ISOLATED PERFUSED LIVER.

(Eng.) Noda, T.; Araki, K.; Koida, M.; Kaneto, H. (Dept. Pharmacology, Nagasaki Univ., Nagasaki, Japan). *Jpn. J. Pharmacol.* 25(3):325-333; 1975.

The isolated liver perfusion technique was used to study the disappearance patterns of foreign compounds *in vivo* and the influence of drug pretreatments to stimulate or depress liver function in male Wistar rats. The animals received phenobarbital sodium (80 mg/kg/day, i.p.) for 4 days, ethionine (100 mg/kg/day, i.p.) for 2 days, or saline for 2 or 4 days, after which their livers were perfused (120 ml). In the phenobarbital-pretreated liver, the disappearance rates of *p*-nitrophenol (PNP, 32 µmol in the perfusate initially) and hexobarbital (HEX, 100 µmol) were significantly accelerated. Ethionine pretreatment reduced the disappearance rates of HEX, BSP, and inodocyanine green (ICG). When phenobarbital or ethionine was added directly to the perfusate of livers from untreated rats, there was no change in the disappearance pattern of BSP. When the control liver was perfused with the medium containing BSP, over 20% of the dye was recovered from the bile within 1 hr. Phenobarbital pretreatment markedly accelerated the excretion rate, while ethionine decreased the excretion rate to about one-half of the control level. ICG excretion (2% after 1 hr) was unaffected by phenobarbital and was decreased with ethionine. PNP excretion (3% after 40 min) was accelerated by phenobarbital pretreatment. Phenobarbital pretreatment increased the flow rate of perfused liver when BSP or PNP was added to the perfusate. This effect was masked in the presence of HEX or ICG in the medium. Ethionine pretreatment reduced the flow rate, and the effect was not influenced by the compound added to the perfusate. Since the results obtained with the perfused liver parallel those of *in vivo* liver function, the isolated perfused liver is useful for the direct study of the liver as a drug metabolizing tissue.

8515 ON THE MECHANISMS OF BILIARY EXCRETION OF THE BILIARY CONTRAST MEDIUM IOGLYCAMIDE IN THE GUINEA PIG RELATIVE TO BILE FLOW. (Ger.) Klapdor, R.; Valerius, H.; Zschukke, N. (I. Medizinische Klinik der Universitat Hamburg, Hamburg, W. Germany). *Res. Exp. Med. (Berl.)* 167(3):217-229; 1976.

The mechanistic role of bile flow in the distribution and biliary excretion of the contrast medium ioglycamic acid and the response of the medium to bile acid or secretin stimulation of bile flow was examined in cholecystectomized guinea pigs. The physiology of bile excretion in the guinea pig was found to replicate that for other experimental animals. Bile excretion of ioglycamic acid was limited by a biliary transport maximum. It was also excreted against a concentration gradient in bile (the concentration ratio of ioglycamic blood to ioglycamic bile was 1:34). Both results suggest active ioglycamic excretion in the bile. The bile flow, biliary ioglycamic acid concentration, and excretion were closely correlated to maximize the transport maximum. There was also a significant positive linear correlation between its transport maximum and basal bile flow; there was no positive correlation between transport maximum and maximum concentration in bile, both of which variables remained relatively constant. The choleretic activity of ioglycamic acid would explain the positive correlation between transport maximum and maximally stimulated bile flow. It follows that there is a positive correlation between basal and maximal flows. Neither stimulation of canalicular bile flow by bile acids nor ductal flow by secretin induced an increased ioglycamic acid excretion per unit of time; with augmented bile flow, the concentration in bile decreased proportionately, so that the transport maximum could remain constant. The independence of transport maximum and bile flow means that biliary ioglycamic acid concentration is dependent on bile flow.

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8516 MECHANISMS OF BILE SECRETION IN GUINEA PIGS. (Ger.) Klapdor, R.; Schliewe, J.; Valerius, H. (Univ.-Krankenhause Eppendorf, D-2000 Hamburg 20, Martinistrasse 52, W. Germany). *Res. Exp. Med. (Berl.)* 166(3):241-251; 1975.

Species differences in bile formation by guinea pigs were examined in a series of experiments. Spontaneous bile flow and total bile acid pool, with and without phenobarbital (PHB), effect of i.v. choleretics, and erythritol clearance were measured in 21 animals. After interruption of enterohepatic circulation, there was an initial decline in bile flow and bile acid pool, both of which were linearly correlated. The slope of the regression line suggested there was both a bile acid-dependent and bile acid-independent fraction of bile volume. In fasting, 92% of the bile acid pool was stored in the gallbladder; 8% was in the enterohepatic circulation. PHB treatment led to an increase in the bile salt-independent fraction, which is stimulated by choleretics in other species. Taurocholate, i.v., induced both an elevation in bile flow and the bile acid pool, and, consequently, to an increase only in the bile salt-dependent fraction. Taurocholate and ioglycamide elicited an increase in erythritol clearance, as well as bile flow; secretin only increased bile flow. It follows that taurocholate and ioglycamide stimulate so-called canalicular bile flow, while secretin stimulates ductal bile flow. Low cholesterol and bilirubin and elevated LDH and HBDH were characteristic of guinea pigs.

8517 ENZYME HISTOCHEMICAL STUDIES OF RABBIT BILE DUCTS WITH AND WITHOUT BILE FLOW. (Eng.) Simert, G.; Hammar, E.; Hansson, J. A.; Hagerstrand, I.; Vang, J. (Lund's Hosp., Lund, Sweden). *Acta Pathol. Microbiol. Scand.* [*A*] 84(1): 33-39; 1976.

To determine whether bile influences enzyme patter in the extrahepatic bile ducts, the activities of 10 enzymes were studied histochemically in the duct of normal rabbits and in rabbits in which the comm duct had been tied and a cholecystoduodenostomy ha been performed. In the normal ducts, the alkaline phosphatase activity was mainly concentrated in the connective tissue, in the vessel walls, and in the cells situated immediately beneath the epithelium; this activity decreased gradually away from the lumen, and in the luminal epithelium, there was no activity. Acid phosphatase was weakly active in th epithelium, and there was an increase in activity close to the duodenum. ATP activity was found in the epithelium near the lumen. There was very strong subepithelial activity in the basal membrane and in the stromal vessel walls. Leucine aminopeptidase showed no activity in the epithelium, but there was strong activity in a narrow subepithelial zone corresponding to the basal membrane and modera activity in the stromal vessel walls and in the collagenous connective tissue. Nonspecific esteras showed an even cytoplasmic activity in the epitheli cells, but not elsewhere in the wall. The activity of β-glucuronidase was moderately pronounced in the epithelial cell cytoplasm, and there was no other activity in the wall. Succinic dehydrogenase was strongly active in the epithelium and only moderately active in the vessel walls. Monoaminooxidase was weakly active in the epithelium. LDH had an even cytoplasmic distribution, and its activ ity increased toward the duodenal mucosa. Gammaglutamyl transpeptidase activity was seen only in the cytoplasm of some of the deep crypts. After 24 hr of bile flow diversion, a distinct infiltration of polymorphonuclear leukocytes appeared, especially in the outer areas of the common duct; however, this appeared to be a response to the operative trauma, as it disappeared after 10 days. There were no changes in the enzyme activities or in the histological appearance of the bile duct below the ligature up to the end of the experiment, 30 days after operation.

BILE ACID METABOLISM IN MAMMALS: IX. CONVERSION OF CHENODEOXYCHOLIC ACID TO CHOLIC BY ISOLATED PERFUSED RAT LIVER. (Eng.) Yousef,
.; Fisher, M. M. (Dept. Pathology and Medicine,
. Toronto, Toronto, Ontario, Canada). *Lipids*
):571-573; 1975.

spectroscopy and radio gas chromatography were
to identify a trihydroxy bile acid synthesized
exogenous chenodeoxycholic acid (CDCA) by the
ated perfused rat liver. In 12 experiments on
Wistar rats of each sex, a mixture of 1 µmol
and 5 µCi radiolabeled (C^{14} in the C-24 posi-
) CDCA was purified by thin-layer chromatog-
y (TLC) before addition to the perfusion medium.
other six experiments were carried out in male
; 10, 20, or 30 µmol of CDCA was added to the
usion medium. Each perfusion was continued for
following the addition of CDCA. Bile acid
yl esters of the various perfusions were pooled,
erted to trimethylsilyl esters and analyzed by
mbined gas-liquid chromatography—mass spectro-
y system and by radio gas chromatography. In
rol experiments in which no exogenous bile acid
added to the perfusion medium, biliary secretion
ile acids in 3 hr was negligible. When 1 µmol
was added to the perfusion medium, 91 and 89%
he bile acid was secreted in the bile produced
he livers of male and female rats, resp. Beta-
cholic acid accounted for 10% of the biliary
acids in females and 38% in males. CDCA
unted for 60% of biliary bile acids in females
31% in males. In both male and female rats,
ydroxy bile acid, previously identified as
ic acid, accounted for approximately 30% of the
ary bile acids secreted. There was no signifi-
difference in specific activity of β-muricholic,
, or trihydroxy acid as measured by direct count,
-liquid chromatography quantitation of various
bands of methyl esters, or by radio gas chroma-
aphy. In studies using the livers of male rats
10-30 µmol CDCA, it was found that the amount
-muricholic acid secreted in the bile increased
ressively as the amount of CDCA added to the
usion increased. This was not the case for
ic acid. These studies demonstrate that mammal-
liver can hydroxylate (12α) the ring structure
ile acids after oxidation of their side chain.
low perfusion medium concentrations of CDCA,
t 30% CDCA can be converted to cholic acid. The
acity of isolated perfused liver of the male rat
convert CDCA to cholic acid appears limited.

CONVERSION OF CHOLESTEROL INTO BILE ACIDS AND REGULATION OF THIS PROCESS. (Rus.)
isova, O. K. (Inst. Experimental Medicine, USSR
l. Medical Sciences, Leningrad, USSR). *Vopr. Med.*
n. 21(5):461-469; 1975.

lies on the biosynthesis of bile acids from cho-
terol and on the regulation of this process are
iewed. Bile acids are synthesized by the liver
n the catabolic cholesterol pool originating from
degradation of lipoproteins. The oxidation of
lesterol to cholic acid includes such reactions
7-α- and 12-α-hydroxylations, stereospecific reduction of the C_5-C_6 double bond, inversion of the 3-β-hydroxyl group into a 3-α-hydroxyl group, and the degradation of the cholesterol side chain, leading to a carboxyl group at C_{24}. The common precursor of cholic and chenodeoxycholic acids is believed to be 7-α-oxycholest-4-en-3-one, which is converted to 7-α-oxy-5-β-cholestan-3-one, and further to 5-β-cholestan-3-α, 7-α-diol. The latter is hydroxylated in the C_{26} position to 5-β-cholestan-3-α, 7-α-26-triol, which is ultimately converted into chenodeoxycholic acid. The coenzyme A esters of bile acids are synthesized in the liver and conjugated with taurine and glycine. This process is catalyzed by lysosomal acyl transferase and regulated by diet, vitamins, and hormones. The conjugated cholic and chenodeoxycholic acids undergo enzymatic deconjugation and 7-α-dehydroxylation in the small intestine to form deoxycholic and lithocholic acid, resp. The biosynthesis of bile acids is controlled by the quantity of the bile acids returning to the liver within the enterohepatic circulation by a negative feedback. The biosynthesis of bile acids is considerably influenced by thyroid, gonadal, pituitary, and adrenal hormones.

8520 SYNTHETIC CAPACITY AND CELL METABOLITES OF BILE DUCT OBSTRUCTED RAT LIVERS. EFFECT OF FREE AND CONJUGATED DIHYDROXY BILE ACIDS. (Eng.)

Liersch, M. A.; Hesse, W. (Medizinische Klinik der Universitat, 69 Heidelberg, Bergheimer Str. 58, W. Germany). *Acta Hepatogastroenterol.* 22(5):281-289; 1975.

Liver cell metabolites were measured, and the capacity of the perfused cholestatic rat liver to produce glucose, urea, and ketone bodies was examined. In addition, the influence of dihydroxy bile acids on normal and bile duct-ligated rat livers was studied. The concentrations of adenine nucleotides, lactate, pyruvate, 3-hydroxybutyrate, acetoacetate, glucose, and uridine diphosphate-glucose in the cholestatic livers were not significantly different from those in sham-operated control livers. The glycogen content of the cholestatic livers was 50% lower than that in normal livers. Gluconeogenesis from lactate and urea production from ammonium chloride were only slightly reduced in bile-duct obstructed livers. Protein content in the bile duct-ligated livers (62.6 mg/g) was decreased in comparison with that in normal livers (86.3 mg/g). The administration of 0.25 mM taurochenodeoxycholate or chenodeoxycholate did not affect the metabolism of normal or cholestatic livers. Ketone body production from oleate (150 µmol) was reduced to 66% in bile duct-obstructed livers, and the addition of 0.25 mM taurochenodeoxycholate to the perfusion medium of the cholestatic livers further reduced this value to 45% of normal. In contrast to previous studies, chenodeoxycholate induced neither cholestasis nor a marked fall in the ATP content of normal livers of female Wistar rats.

8521 INFLUENCE OF (+)-CYANIDANOL-3 ON BILE FLOW AND BILIRUBIN EXCRETION IN HETEROZYGOUS GUNN RATS. (Eng.)

Horak, W.; Seyfried, H.; Grabner, G. *In: New Trends in the Therapy of Liver Diseases. Proceedings of the International Symposium on New*

Trends in the Therapy of Liver Diseases, Tirrenia, 6-7 June 1974. Bertelli, A., ed. (New York: S. Karger): pp. 110-113; 1975.

The effect of (+)-cyanidanol-3 on bile flow and biliary bilirubin excretion in heterozygous Gunn rats weighing 200-320 g was investigated. Animals of one group were treated for 6 weeks with daily s.c. injections of (+)-cyanidanol-3, 5 mg/100 g body weight; those of the second group received phenobarbital, 8 mg/100 g body weight, and those of the control group received 0.5 ml saline. Bilirubin transport maximum was assessed by an infusion of unconjugated bilirubin (0.2 mg/min/100 g). Treatment with phenobarbital caused a significant increase in liver weight ($p<0.005$), bile flow ($p<0.05$), and maximum biliary bilirubin excretion ($p<0.005$). The respective values were 3.40 g/100 g body weight, 8.00 μl/min/100 g, and 50.20 μg/min/100 g; control values were 2.40 g/100 g, 7.00 μl/min/100 g, and 28.50 μg/min/100 g. The bilirubin transport maximum was augmented not only by increased bile flow and by an increase in total and conjugated bilirubin concentrations in the bile. Treatment with (+)-cyanidanol-3 had no effect on liver weight, bile flow, and bilirubin excretion. These results do not explain the accelerated decrease of serum bilirubin levels in patients with acute viral hepatitis treated with (+)-cyanidanol-3. The effect of this drug is apparently different from the action of phenobarbital.

8522 SIGNIFICANT PATHWAYS OF HEPATIC ETHANOL METABOLISM.

(Eng.) Thurman, R. G.; McKenna, W. R.; Brentzel, H. J., Jr.; Hesse, S. (Johnson Res. Foundation, Univ. Pennsylvania, Philadelphia, PA 19174). *Biol. Alcohol Alcoholism* 34(11):2075-2081; 1975.

The mechanism of microsomal ethanol oxidation is reviewed. Rat liver microsomes oxidize ethanol two to three times faster than propanol when incubated with either an NADPH- or an H_2O_2-generating system. In addition, solubilized purified microsomal subfractions contain protein with an electrophoretic mobility identical to rat liver catalase on sodium dodecyl sulfate-polyacrylamide gels, suggesting that the separation of catalase from cytochrome P-450 and other microsomal components may not be feasible. These data support the hypothesis that catalase is responsible for NADPH-dependent microsomal ethanol oxidation. Direct readout techniques for pyridine nucleotides, the catalase-H_2O_2 complex, and cytochrome P-450 were used to evaluate the specificity of inhibitors of alcohol dehydrogenase (4-methylpyrazole, 4 mM) and catalase (aminotriazole, 1.0 g/kg) qualitatively in perfused rat livers. 4-Methylpyrazole and aminotriazole are specific inhibitors for alcohol dehydrogenase and catalase, resp., under these conditions. When used alone or in combination, neither inhibitor altered the mixed function oxidation of p-nitroanisole to p-nitrophenol, as observed by oxygen uptake and product formation. When ethanol utilization was measured over a concentration range of 20-80 mM in perfused liver, a concentration dependence was observed. At low concentrations of etha-
nol, ethanol oxidation was almost abolished by 4-
methylpyrazole; however, the contribution of 4-me
pyrazole-insensitive ethanol uptake increased as
a function of ethanol concentration, and at 80 mM
ethanol, ethanol utilization was nearly 50% methy
pyrazole-insensitive. This portion of ethanol ox
dation was abolished by aminotriazole. The data
indicate that alcohol dehydrogenase and catalase-
H_2O_2 are responsible for hepatic ethanol oxidatio
At low ethanol concentrations (<20 mM), alcohol d
drogenase is predominant, but at concentrations u
to 80 mM, the contribution of catalase-H_2O_2 to ov
all ethanol utilization is significant. There wa
no evidence for involvement of the endoplasmic re
ulum in ethanol metabolism in the perfused liver.

8523 THE EFFECT OF ACUTE ALCOHOLIC POISONING THE SYNTHESIS OF RNA AND PROTEINS IN TH LIVER OF RATS AT DIFFERENT TIMES OF THE DAY.

(Ru
Latenkov, V. P. (Tyumen Medical Inst., Tyumen, US
Farmakol. Toksikol. 39(1):101-104; 1976.

The effect of acute ethanol intoxication on prote
and RNA synthesis by hepatocytes was studied in m
albino rats at different times of the day by auto-
radiographic study of ^{3}H-uridine and ^{35}S-methioni
incorporation in hepatocyte nuclei and cytoplasm.
Two groups of rats weighing 150 g received a sing
dose of 80-proof ethanol (1.5 ml/kg) through gast
tube at 9 a.m. or 9 p.m.; they were sacrificed 12
hr later, 2 hr after the i.p. administration of
labeled uridine and methionine. The uridine labe
indices in the control group were 2.88% at 9 a.m.
and 5.4% at 9 p.m. in the hepatocyte nuclei, and
at 9 a.m. and 54.4% at 9 p.m. in the cytoplasm.
the test group, the nuclear labeling indices were
1.78% at 9 a.m. and 2.11% at 9 p.m.; the cytoplas
labeling indices were 14.8% at 9 a.m. and 27.6% a
9 p.m. The nuclear methionine labeling indices i
the control group were 3.46% at 9 a.m. and 5.46%
at 9 p.m. versus 24.1% at 9 a.m. and 49.1% at 9
p.m. in the cytoplasm. In the test group, the
methionine labeling indices were 3.53% at 9 a.m.
and 5.06% at 9 p.m. in the nuclei, and 21.2% at 9
a.m. and 32.9% at 9 p.m. in the cytoplasm. The
findings indicate the considerable inhibitory act
of ethanol on protein and RNA synthesis by hepato
cytes, and persistence of the endogenous diurnal
rhythm of protein and RNA synthesis, even under
the influence of ethanol.

8524 EFFECTS OF A CHOLINE-DEFICIENT DIET ON INDUCTION OF DRUG- AND ETHANOL-METABOL ENZYMES AND ON THE ALTERATION OF RATES OF ETHANO DEGRADATION BY ETHANOL AND PHENOBARBITAL.

(Eng.
Mezey, E.; Potter, J. J.; Brandes, D. (Baltimore
City Hosp., Baltimore, MD 21224). *Biochem. Phar
macol.* 24(21):1975-1981; 1975.

A choline-deficient diet was fed to male Wistar
to determine the effect *in vivo* of alterations i
phospholipids on microsomal enzyme systems, on
ethanol-oxidizing enzymes, on rates of ethanol m
olism, and on the adaptive responses of all para-

ers to ethanol and phenobarbital administration.
one series of experiments, the animals received
holine-deficient or a choline-supplemented diet,
h either ethanol or sucrose making up 36% of the
ories. In a second series of experiments, the
s were fed the choline-deficient (2.0 g dihydrogen
rate/100 g diet) or choline-supplemented diets
3 weeks; for 5 days during the last week of
ding, half of the animals in the choline-deficient
choline-supplemented groups received i.p. injec-
ns of sodium phenobarbital (80 mg/kg), and the
er half, i.p. injections of saline. In both exper-
nts, choline deficiency resulted in increased
al liver lipids. In the first series, the values
e 54.5 and 259.2 mg/g in choline-supplemented
choline-deficient animals on sucrose diets, resp.,
52.1 and 187.5 mg/g in animals on ethanol diet,
p. In the second series, the levels were 69.8
253.2 mg/g in animals on choline-supplemented
choline-deficient diets alone, and 64.6 and 237.6
g, resp., in animals treated with phenobarbital.
total liver triglycerides, the values in the first
ies were 11.5, 100.4, 13.9, and 66.9 mg/g, resp.;
the second series, they were 6.1, 106.6, 8.9, and
.2 mg/g, resp. Total phospholipids decreased in
animals on the choline-deficient diets, due pri-
ily to a decrease in phosphatidylcholine. Choline
iciency did not result in changes in microsomal
ymes or parameters of ethanol metabolism. It did
vent optimal induction of aniline hydroxylase
ivity by both ethanol (14.0 nmol/mg/hr versus
7 nmol/mg/hr in ethanol-treated animals on supple-
ted diet) and by phenobarbital (15.0 nmol/mg/hr
sus 23.3 nmol/mg/hr in phenobarbital-treated
mals on supplemented diet) and optimal induction
cytochrome P-450 activity by ethanol (1.43 nmol/
versus 1.76 nmol/mg) and by phenobarbital (1.69
l/mg versus 1.90 nmol/mg). Optimal induction of
rosomal protein concentration and cytochrome b_5
phenobarbital, and ethanol-induced increases, both
the activity of microsomal ethanol-oxidizing
tem and in the rates of ethanol disappearance
m the blood, were also reduced. Alcohol de-
rogenase activity remained unchanged. The results
onstrate that dietary choline is required for
imal induction of microsomal enzymes by both
anol and phenobarbital and for increases in
anol metabolism induced by ethanol administration.
is suggested that a decrease in available hepatic
sphatidylcholine, due to choline deficiency, is a
se of inhibition of the optimal induction of
rosomal enzyme.

5 IMMUNOCHEMICAL RELATIONSHIP BETWEEN α-AMYLASES OF RAT LIVER, SERUM, PANCREAS

PAROTID GLAND. (Eng.) Messer, M.; Dean, R. T.
pt. Biochemistry, Univ. Sydney, Sydney, N.S.W.
6, Australia). *Biochem. J.* 151(1):17-22; 1975.

immunochemical relation between α-amylases in
rat liver, serum, pancreas, and parotid gland
studied using rabbit antisera to purified rat
otid gland amylase and to crude rat parotid
nd extract. Antisera was prepared by injecting
h purified (anti-B and anti-C) and crude (anti-
rat parotid gland extract i.m. into New Zealand
White rabbits. Agarose gel double-diffusion of purified parotid gland, serum, and liver amylase preparations gave a single continuous precipitin line against anti-A, -B, and -C. A precipitin line was also seen with pancreatic amylase, but only at high concentrations (500 U/ml). When parotid gland, serum, or liver amylases were allowed to electrophorese into agarose gel containing antisera B or C, single rocket-shaped precipitin lines were seen in each. The ratios of antisera B to amylase in the precipitin lines were: 0.38, 0.34, 0.32, and 10 µl/U for parotid gland, serum, liver, and pancreatic amylase, resp. The ratios were: 1.7, 1.7, and 1.6 µl/U with antisera C for parotid gland, serum, and liver amylase, resp. The inhibition curves for serum and liver amylase were identical, and were similar to the curve for parotid gland amylase, but were very different from that of pancreatic amylase; 50% inhibition was produced by 0.46, 0.46, 0.56, and 39 µl antiserum/amylase unit, resp. After immunoprecipitation, there was further loss of activity with pancreatic amylase. It is concluded that rat liver and serum amylases are identical and are closely related to parotid gland amylase. All three are significantly different from pancreatic amylase and are produced by different genes. These data support the suggestion that the liver is the main source of serum amylase.

8526 POSSIBLE MECHANISM OF INDUCTION OF LIVER MICROSOMAL MONOOXYGENASES BY PHENOBARBITAL.

(Eng.) Tsyrlov, I.-B.; Zakharova, N. E.; Gromova, O. A.; Lyakhovich, V. V. (Academy Medical Sciences USSR, Siberian Branch, Novosibirsk 630091, USSR). *Biochim. Biophys. Acta* 421(1):44-56; 1976.

The mechanisms involved in the induction of microsomal monoxygenases by 3-methylcholanthrene or phenobarbital were studied, using a model in which maximal induction by 3-methylcholanthrene was followed by phenobarbital treatment in male Wistar rats. 3-Methylcholanthrene treatment (50 mg/kg/day, i.p.) for 2 days led to an increase of up to 185% in the CO-binding hemoprotein content in the form of cytochrome P-448; the subsequent discontinuation of treatment with the inducer had practically no effect on the amount of P-448 during the next 2 days. The administration of phenobarbital (100 mg/kg/day, i.p.) alone for 2 days caused an increase of up to 235% in the amount of cytochrome P-450. After maximal induction by 3-methylcholanthrene, phenobarbital treatment led to an increase in the hemoprotein content of up to 350% of the control value, i.e., there was an evident additive effect resulting from the consecutive induction by two drugs. At the same time, there was a considerable gain in the content of low-spin species in hemoprotein, without an accompanying rise in the content of its high-spin species. Treatment with both inducers increased the velocity of the rapid phase of the NADPH-dependent reduction of CO-binding hemoprotein to a level corresponding to 205% of the rate seen in the control preparations. In addition, there were considerable increases in the rates of microsomal aminopyrine and aniline metabolism. The activity of aminopyrine *N*-demethylase was also elevated.

The data indicate that the location of the CO-peak of $Na_2S_2O_4$-reduced hemoprotein is not the criterion of monoxygenase functional specificity; the latter is possibly defined by the relation between the contents of the high-spin and low-spin species of the cytochrome.

8527 THE TOPOGRAPHICAL LOCATION AND UNIQUE NATURE OF A GLUCOKINASE ASSOCIATED WITH THE GOLGI APPARATUS OF RAT LIVER.

(Eng.) Berthillier, G.; Coleman, R.; Walker, D. G. (Dept. Biochemistry, Univ. Birmingham, P.O. Box 363, Birmingham, B15 2TT, England). *Biochem. J.* 154(1):193-201; 1976.

To confirm the existence of a glucokinase in the Golgi apparatus, and to examine its topographical relationships, a Golgi-rich fraction was prepared directly from the livers of Wistar rats. The activities of UDP-galactose-*N*-acetyl-glucosamine galactosyltransferase and thiamin pyrophosphatase were enriched 15- and 13-fold, resp., in the Golgi preparation, in comparison to the whole homogenate. Glucose 6-phosphatase and glucose 6-phosphate dehydrogenase activities were not detectable in the Golgi fraction, excluding contamination by both endoplasmic reticulum and cytosol. Precise evaluation of particulate glucokinase activity in the homogenate was not possible because of the relatively large quantity of soluble enzyme; glucokinase activity was enriched in the Golgi preparation fivefold over that in the material applied to the density gradient. Phosphofructokinase, aldolase, and pyruvate kinase activities were not detected in the Golgi preparation, and only a trace of lactate dehydrogenase was present. The latter could easily be removed by washing with 3 M KCl. A procedure that disrupts the entire membrane structure was always required for the measurement of glucokinase activity in Golgi preparations. The typical latency curve obtained for the effect of Triton X-100 showed that, above a final concentration of 0.015%, membranes began to be disrupted, allowing the penetration of substrates to the site of the enzyme. Four successive freezing and thawing operations were necessary to liberate all latent activity from Golgi vesicles. The nonliberation of phospholipids of the membranes by this procedure suggested that no membrane fragments are present in the supernatant, where all the glucokinase activity is finally recovered. Hence glucokinase is unlikely to be embedded in the lipid layer of the Golgi membranes. Glucokinase solubilized from the Golgi preparation did not cross-react with an antiserum prepared against cytoplasmic glucokinase and showed different affinity from the cytoplasmic enzyme for concanavalin A. In diabetic and neonatal rat livers, the activities of Golgi glucokinase were similar to those found in the adult animal, suggesting that the two glucokinase enzymes do not have the same metabolic role in the liver cell. A portion of the total hepatic activities of UTP-glucose 1-phosphate uridyltransferase and phosphoglucomutase also appeared to be located in the Golgi apparatus. Together with the glucokinase, these two enzymes would facilitate the biosynthesis of UDP-glucose from glucose.

8528 RECYCLING OF GLUCOSE BY RAT HEPATOCYTES.

(Eng.) Katz, J.; Wals, P. A.; Golden, S.; Rognstad, R. (Cedars-Sinai Medical Res. Inst., 4751 Fountain Ave., Los Angeles, CA 90029). *Eur. J. Bi* *chem.* 60(1):91-101; 1975.

To establish and quantitate the recycling of gluco in hepatocytes from fed and fasted rats, the metab lism of glucose labeled uniformly with ^{14}C, and in positions 2, 3, and 5, with ^{3}H was studied. Cells w incubated with glucose as the sole substrate or wi glucose and a variety of glucose precursors, and t uptake or production of glucose and the utilizatio of the isotopes were determined. There was no glu cose uptake at concentrations of up to 15 mM. ^{14}C was, however, recovered in CO_2, lactate, and amino acids, and ^{3}H was recovered in water. Considerabl incorporation from ^{14}C- and ^{3}H-labeled glucose int glycogen occurred at high glucose concentrations (>20 mM). The yield in water always exceeded that in ^{14}C-labeled products. The yield in ^{3}HOH from [2-^{3}H]glucose exceeded that from [5-^{3}H]glucose, an the latter was greater than from [3-^{3}H]glucose. Utilization of labeled glucose did not follow Michaelis-Menton kinetics. The fractional rate of uptake of ^{14}C- and ^{3}H-labeled glucose increase with glucose concentration, with a maximum at abou 15 mM, and then declined. The effect of gluconeogenic substrates on the isotope utilization and th ^{3}H/^{14}C ratio in glycogen was studied. The ^{14}C uptake was always depressed. Addition of lactate and dihydroxyacetone had little effect on the detr tiation of [2-^{3}H]glucose, but it was depressed by other substrates. The detritiation of [3-^{3}H]- and [5-^{3}H]glucose was depressed in gluconeogenesis, an that from [3-^{3}H]glucose was usually depressed mor than from [5-^{3}H]glucose. In the presence of lact detritiation of [3-^{3}H]glucose was about half that from [5-^{3}H]glucose. The estimate of glucose phos phorylation required the determination of the spe fic activity of glucose 6-phosphate from [2-^{3}H]gl cose. It appeared that futile cycling between gl cose and glucose 6-phosphate was extensive in cel with a high glycogen content, but was low in cell from starved rats, and was nearly absent in those from diabetic animals. The estimation of the pho phorylation of fructose 6-phosphate in the presen of cycling requires knowledge of the specific act ties of fructose 6-phosphate and fructose 1,6-bis phosphate from [3-^{3}H]glucose. At present, there are no adequate data to calculate phosphorylation and recycling of fructose 6-phosphate, but under some conditions, the rate may be quite high.

8529 CELLULAR METABOLITE DISTRIBUTION AND TH CONTROL OF GLUCONEOGENESIS IN THE PERFU ISOLATED RAT LIVER.

(Eng.) Parrilla, R.; Ayuso-Parrilla, M. S. (Dept. Metabolism, Instituto G. Maranon, C.S.I.C., Velazquez 144, Madrid-6, Spain *Pfluegers Arch.* 362(1):49-54; 1976.

To study the hepatic intracellular distribution o certain metabolites under conditions of perfusion of the isolated organ, glucose production wa measured in isolated Wistar rat livers perfused with 100 ml of blood-free recirculating medium. gluconeogenic rate, using L-alanine as substrate, was only 55% of that obtained with L-lactate. Th steady-state concentration of gluconeogenic and tricarboxylic acid cycle intermediates were measu

reeze clamped biopsies. In comparison with
r perfused with L-alanine, livers perfused with
ctate displayed higher concentrations of malate
n 1,186 versus 616 nmol/g), α-glycerophosphate
34 versus 643 nmol/g), and β-hydroxybutyrate
29 versus 1,572 nmol/g), probably as a result of
gher state of reduction of the nicotinamide
em. Hexose-phosphate intermediates were also
htly increased when L-lactate was the substrate.
omparison with livers perfused with L-alanine,
livers perfused with L-lactate had lower concen-
ions of phosphoenolypyruvate (466 versus 2,789
/g) and 3-phosphoglycerate (351 versus 6,127
/g). Livers perfused with L-lactate displayed
er cytosolic concentrations of all the tricarb-
ic acid cycle intermediates except oxaloacetate,
e glutamate was slightly higher, and aspartate
iderably higher, when alanine was the substrate.
he mitochondrial compartment, the pattern of
ribution tended to be the opposite; that is,
rs perfused with L-lactate showed lower concen-
ions of all the intermediates except α-ketoglu-
te. The mitochondrial:cytosolic metabolite
ients of all the intermediates whose distribu-
was studied were higher in livers perfused with
anine. During gluconeogenesis from alanine, an
ustation of the cytosolic α-ketoglutarate is
ably prevented by a continuous deamination of
amate; this implies that there must be a gluta-
mitochondrial entry and α-ketoglutarate exit.
, the rate of movement of any of these anions
ss the mitochondrial membrane or the activity
lutamate dehydrogenase may control pyruvate
ation, and, as a result, the rate of gluconeo-
sis.

THE EFFECT OF SOME GLUCOCORTICOIDS ON HEPATIC MICROSOMAL HYDROXYLATION IN THE
ND HAMSTER. (Eng.) Tredger, J. M.; McPherson,
.; Chakraborty, J.; Bridges, J. W.; Parke, D. V.
. Biochemistry, Univ. Surrey, Surrey GU 5XH,
Britain). *Naunyn Schmiedebergs Arch. Pharma-*
292(3):267-270; 1976.

effect of glucocorticoids on hepatic microsomal
enyl and aniline hydroxylations was investigated
le Wistar rats and golden syrian hamsters.
$^{-4}$ M, corticosterone, cortisol, 6-β-hydroxy-
costerone, prednisolone, betamethasone, dexa-
asone, or 3,4-benzpyrene produced little change
e biphenyl-4-hydroxylase and aniline-4-hydroxy-
activities *in vitro*. In contrast, 10^{-4} M pred-
one, corticosterone, dexamethasone, and beta-
asone produced 65%, 104%, 163%, and 680% increas-
microsomal biphenyl-2-hydroxylase activity,
None of these steroids caused a similar
ease in biphenyl-2-hydroxylation when hamster
microsomes were used. When betamethasone was
istered *in vivo* (36 μmol/kg, i.p.), cytochrome
and biphenyl-4-hydroxylase activities were
ally depressed in both rats and hamsters,
as aniline hydroxylase activity was marginally
r than the control values. A slow rise in all
parameters then followed in both species.
48 hr, the increased enzyme activities and
hrome P-450 contents continued up to the term-

ination of the experiment at 64 hr in the hamster, but not in the rat. In the hamster, after the administration of betamethasone, a gradual rise in the biphenyl-2-hydroxylase activity was observed, which became prominent after 24 hr and rose to 260% and 380% of control values at 48 hr and 64 hr, resp. In the rat, a sharp rise in biphenyl-2-hydroxylation occurred after betamethasone administration, peaking at 4 hr to 440% of the control level. An equally rapid fall in the enzyme activity then followed, reaching almost the control values again in 8 hr. Biphenyl-2-hydroxylase activity then rose again to 410% and 458% of the control levels at 48 hr and 64 hr, resp. In view of the specificity, the rate and magnitude of the enhancement of biphenyl-2-hydroxylase activity, especially with betamethasone, and the fact that the effect can be produced very rapidly in microsomal preparations devoid of DNA, *de novo* protein synthesis cannot be involved. The most likely explanation is that it is the result of interaction of the steroid with the endoplasmic reticulum, causing a specific configurational change, which is expressed as an increase in biphenyl-2-hydroxylase activity.

8531 COMPARATIVE STUDIES IN BLOOD, BILE AND URINE TO THE BILIARY EXCRETION AND MULTI-COMPARTMENTAL ANALYSIS OF GLYCOCHOLIC ACID IN THE UNANESTHETIZED PIG.
(Ger.) Klapdor, R.; Bolte, J.; Schlosser, G. A. (Univ.-Krankenhaus Eppendorf, I. Medizinische Klinik, D-2000 Hamburg 20, Martinistr. 52, W. Germany). *Res. Exp. Med. (Berl.)* 166(3):209-219; 1975.

An experimental model for comparing blood, bile, and urine variables in mechanistic studies of bile excretion and multicompartmental assay of conjugated bile acids was developed in young pigs. After T-drain insertion, cholecystectomy, and establishment of fasting values, the distribution and excretion kinetics of labeled glycocholic acid (GA) were quantified in nonanesthetized animals. On interruption of the enterohepatic circulation, the bile volume and total bile acid excretion decreased, but the bilirubin remained constant. A linear correlation was found between bile volume and acid, suggesting a bile salt-dependent fraction, but the slope of the regression line also indicated the presence of a bile salt-independent fraction. Three-compartment analysis of GA excretion found 80% excreted with the bile after 50 min and 83% after 90 min; less than 1% was detected in urine after 90 min. This method is useful for the study of the distribution and excretion kinetics of conjugated bile acids, especially ^{14}C-glycocholic acid, by a 3-compartmental analysis.

8532 SPLANCHNIC VASCULAR RESPONSES TO THE INFUSION OF PROSTAGLANDINS A_1, A_2, AND B_1.
(Eng.) Hanson, K. M.; Post, J. A. (Dept. Physiology, Ohio State Univ., 333 West Tenth Ave., Columbus, OH 43210). *Pharmacology* 14(2):166-181; 1976.

The effects of prostaglandins A_1, A_2, and B_1 (PGA_1, PGA_2, and PGB_1) on the vasculature of the liver and small intestine were studied in 73 dogs. Infusion of PGA$_1$ into branches of the superior mesenteric artery in isolated autoperfused segments of the small intestine at rates of 1, 2, and 50 μg/kg/hr resulted in a significant decrease in resistance and a significant increase in blood flow. The responses peaked after 1 min of infusion, at which time the mean decreases in resistance were 21.2, 30.8, and 51.4%, resp., for the three dose rates, and the mean increases in blood flow were 22.3, 31.9, and 87.3%, resp. When the largest dose was infused into the femoral vein, the dilator response peaked after 2 min, with a mean 17.3% decrease in resistance. β-Adrenergic blockade with sotalol (20 mg/kg) did not affect the response. The response of the small intestinal vasculature to the intra-arterial (i.a.) infusion of PGA$_2$ (50 μg/kg/hr, 10 min) was essentially the same as that seen with PGA$_1$, although the initial vasodilation was less intense (decrease in resistance=31.9%, increase in blood flow=46.0%). During the infusion of PGA$_2$ in the femoral vein, the resistance was decreased 19.2% after 2 min. When PGA$_1$ and PGA$_2$ infusion (i.v. or i.a.) was continued beyond 1 or 2 min, the vasodilation response was lost and converted to vasoconstriction; this response was more pronounced with PGA$_2$. When PGA$_1$ was infused into the hepatic artery, the resistance was decreased, and this was most intense and best sustained at a rate of 50 g/kg/hr; after 1 min, resistance was decreased 23.8%, and after 10 min it was still decreased 21.0%, while the accompanying increase in flow was only one-half that existing at 1 min. The decline in blood flow was paralleled by a decline in arterial pressure. This was most evident during femoral venous infusion of PGA$_1$, when arterial pressure began to decrease almost immediately after the onset of infusion and was decreased 28.6% after 10 min. Hepatic artery flow also fell throughout the entire period of i.v. infusion. Systemic arterial pressure was reduced during i.v. infusion to about three times that seen when infusion was directly into the liver by hepatic arterial or portal venous perfusion. The effects of PGA$_2$ on the hepatic arterial bed and on systemic arterial pressure were similar to those of PGA$_1$, although hepatic artery dilation was less intense and less well sustained. PGB$_1$ had less cardiovascular action than did PGA$_1$ or PGA$_2$. The intrahepatic portal venous vessels were not constricted by PGA$_1$ or PGB$_1$. When evaluating the vascular effects of prostaglandins, the area under study, the route of administration, and the dose must all be considered.

8533 ADENOSINE 3',5'-MONOPHOSPHATE AND THE REGULATION OF RAT HEPATIC STEROL SYNTHESIS: A REEXAMINATION BASED ON SUTHERLAND CRITERIA. (Eng.)

Bricker, L. A.; Kozlovskis, P. L.; Levey, G. S. (Univ. Miami Sch. Medicine, P. O. Box 520875, Biscayne Annex, Miami, FL 33152). *Metabolism* 25(4): 477-481; 1976.

The previously reported ability of adenosine 3',5'-monophosphate (cyclic AMP) at supraphysiologic concentrations to suppress *in vitro* lipogenesis in the rat liver was further investigated to determine whether this suppression is actually a physiologic action of the nucleotide. Theophylline (1 mM), either alone or in combination with cyclic AMP (0.8 mM or 5 mM), did not augment the suppression of sterol synthesis. The effects of a number of compounds structurally related to cyclic AMP, including ATP, ADP, AMP, adenosine, coenzyme A, HMG-coenzyme A, cyclic GMP, uridine, guanosine, deoxythymidine, and ribose-5-phosphate (all at 5 mM) wer tested. All of these, with the exception of ribose 5'-phosphate, produced significant suppression of sterol synthesis (reducing the incorporation of (1-^{14}C)-octanoate into sterol from a mean control level of 1,440 disintegrations/min to 110-975 dpm), suggesting that the cyclic AMP-mediated suppression is not specific. These results suggest that the cyclic AMP-mediated suppression of sterologenesis is not a physiologic effect of the nucleotide.

8534 HEPATITIS IN PRIMATES. (Eng.) Deinhard

F. (Dept. Microbiology, Univ. Illinois Medical Center, Chicago, IL). *Adv. Virus Res.* 20: 113-157; 1976.

Hepatitis in primates is reviewed. Nonhuman primat associated hepatitis in man and transmission of hep titis A and B to nonhuman primates are discussed, and a historical review of attempts to isolate hepatitis viruses and hepatitis B antigen is prese ed. Nonhuman primates have played an important ro in the recent major and rapid advances in hepatiti research. They provide model systems for both hep titis A and B and, perhaps, for hepatitis C. The final definitive identification of the two or thre types of human hepatitis viruses can now be clearl foreseen, and vaccination against human hepatitis will probably be possible. Three events in the 1960's led to explosive progress in hepatitis research: the observation that nonhuman primates, and particularly chimpanzees, could transmit hepatitis to man and that "spontaneous" biochemically and histologically typical viral hepatitis occurre in recently caught chimpanzees; the observation that typical biochemical and histological hepatiti could be induced by parenteral or p.o. inoculation of acute phase sera or feces from human hepatitis A cases in certain species of marmoset monkeys and that disease could be passed serially from animal to animal; and the discovery of the Australia anti gen and its association with hepatitis B. Studies of the Australia antigen led to a recognition of the various morphological forms of hepatitis B surface antigen and the demonstration of the large Dane particle. These discoveries led to many impo tant practical advances, such as prescreening of blood and blood products for HBsAg to detect infec ivity; they also provided an accurate identificati of long-incubation or serum hepatitis as hepatitis B and its clear identification from hepatitis A and possibly C. It was also established that hepatitis B could be transmitted by means ot than direct s.c. or i.v. inoculation.

8535 IN VIVO MICROSCOPIC OBSERVATIONS OF THE PATHOGENESIS OF ACUTE MOUSE VIRAL HEPATI

(Eng.) Bloch, E. H.; Warren, K. S.; Rosenthal, M

t. Anatomy, Case Western Reserve Univ., Cleveland,
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livers of female CF-1 mice infected with MHV-3
l hepatitis (10^4 median tissue culture, i.p.)
examined microscopically *in vivo* to determine
extent of involvement of the hepatic microvas-
: system. Clinicopathologic examinations were
ormed to determine liver and spleen weights,
al pressures, hematocrits, liver function, and
degree of virus infection. The ratios of liver
spleen to body weight increased by day 2 of
ction and peaked on day 6. SGOT levels increased
ly 20-fold by day 4 and returned to normal by
; serum bilirubin doubled by day 3. Virus was
ted in the liver by the end of day 1, the
st titer was reached at the end of day 3, and
irus was no longer detectable by day 8. Post-
sections of the liver showed hepatic patholo-
aracterized by focal and coalescent necrosis.
vo microscopy showed localized areas where the
chyma, sinusoids, and blood were obliterated.
er, immediately peripheral to these lesions,
flow and vessels were unaffected, except for
ized hypertrophy of the Kupffer cells. Although
lesion produced a sinusoidal block to blood
portal hypertension did not occur even in the
nce of extensive focal and confluent necrosis.
mount of liver damage varied considerably from
l to animal. In general, the extent of pathol-
bserved *in vivo* correlated with the histologic-
ndings *in vitro*. The results suggest that
vascular thromboembolism is not involved in
hepatitis. However, the hepatic arteriolar
n probably plays a role in conjunction with
degree of vasodilatation of the sinusoid to
nsate for the sinusoidal block produced by the
-induced lesions.

PREVENTION BY STEROIDS OF CERIUM HEPATOTOXICITY.

(Eng.) Salas, M.; Tuchweber,
nstitut de medecine et de chirurgie experimen-
, Universite de Montreal, C.P. 6128 Montreal,
Canada). *Arch. Toxicol.* 35(2):115-125; 1976.

ffect of phenobarbital and several steroids on
lity, triglyceride content, and liver ultra-
ture was investigated in female Sprague-Dawley
after administration of $CeCl_3$. The animals
treated twice daily, p.o., with 100 mg/kg
enolone-16 α-carbonitrile (PCN), 19 mg/kg
ethasone, 100 mg/kg spironolactone, 60 mg/kg
barbital, and 100 mg/kg estradiol for 3 days
to treatment with 10 mg/kg $CeCl_3$, i.v. From
ys after $CeCl_3$ administration, there was a
ortality, which was totally abolished by pre-
ment with PCN ($p<0.05$) and estradiol ($p<0.05$)
rtially decreased by phenobarbital and spiro-
tone. All dexamethasone-treated rats died
ys postinjection of $CeCl_3$. Hepatic trigly-
concentrations decreased in all groups com-
with the $CeCl_3$-treated group, but the differ-
were statistically significant only in animals
ated with PCN ($p>0.01$), estradiol ($p>0.01$),
amethasone ($p>0.05$). Liver weights were sig-
ntly increased by phenobarbital ($p>0.001$),
>0.01), estradiol ($p>0.01$), and phenobarbital
($p>0.001$). Light and electron microscopy indicated that the hepatocytic damage elicited by $CeCl_3$ was decreased significantly by PCN, estradiol, and dexamethasone. The steroids may have altered the distribution and binding of the metal to the endoplasmic reticulum, thus protecting these membranes against the effect of cerium.

8537 EXPERIMENTAL STUDY OF THE HEPATOBILIARY TOXICITY OF LITHOCHOLIC ACID IN RABBITS.

(Fre.) Vachon, A.; Barthe, J.; Barthe, M. F.; Pichot, J.; Paliard, P.; Grimaud, J.; Hadj Aissa, A. (Clinique Medicale C, Hotel-Dieu, 1, place de l'Hopital, 69288 Lyon Cedex 1, France). *Ann. Gastroenterol. Hepatol.* 12(3):163-175; 1976.

Eleven rabbits received 50 mg lithocholic acid (LA) in standard daily dietary regimens for intervals up to 4 months before sacrifice. After 2 months, the dominant hepatic lesion was portal and periportal ductal proliferation associated with extensive sclerosis and periductal inflammation; perilobular cholestasis was frank. After 3 months, there was also evidence of portal and periportal fibrosis. At 4 months, the ductal proliferation was pronounced, and 50% of the parenchyma was occupied by infiltrative sclerosis. Animals receiving 50 mg LA for 3 months followed by standard diets showed little hepatic alteration, except for plasmocytic periportal inflammation. Serum levels confirmed a cholesterolemia and elevated γ-globulin. No ultrastructural changes were found up to 10 days after 50 mg LA. By day 20, the endoplasmic reticulum was enlarged; there was a further increase by day 30, without alteration of the vesicular architecture. At the hepatocyte poles there was a clear zone devoid of organelles. In some hepatocytes, dense and lamellar microbodies were found. Dilation of interhepatocyte bile canaliculi, with loss of microvilli, was pronounced. The LA activity was situated in the endoplasmic reticulum, confirming the hepatocyte origin of cholestasis.

8538 COMPARATIVE STUDIES OF LIVER FUNCTION BY MEANS OF ^{131}I-ROSE BENGAL FOLLOWING USAGE OF DIFFERENT CONVENTIONALLY EMPLOYED ANESTHETICS.

(Bul.) Atanasov, A.; Zakharieva, Z. (Faculty Medicine, Medical Sch., Plovdiv, Bulgaria). *Khirurgiia (Sofiia)* 28(3):236-242; 1975.

A comparative study of the effect of some commonly used anesthetics on rabbit liver function was conducted with ^{131}I-rose bengal (10 ml/kg diluted to 0.5 ml). The rabbits (110) were divided into four experimental groups: group 1 (50 animals) received narcotane (0.5-1.5 vol%) and the other three groups (15 animals each) received ether (2-5 vol%), petran (0.5-2 vol%), or neuroleptanalgesics. In group 1, anesthesia lasted for 2 hr (15 rabbits) or 4 hr (25 rabbits). In the other groups, anesthesia lasted for 4 hr. The depth of anesthesia was held at stage 3. The neuroleptanalgesics consisted of an initial dose of fentalin (0.10 mg) and dehydrobenzperidol (5 mg), followed by 0.05 mg of fentalin and 2.5 mg of dehydrobenzperidol at 0.5-hr intervals up to 4 hr (total dose: 0.50

mg fentalin and 25 mg dehydrobenzperidol). The following indices were recorded for a 2-hr narcotane anesthesia: time of maximum liver absorption (15.60 min), time of semiexcretion from liver (47.60 min), and time of semiexcretion of blood isotopes (14.13 min). These values are higher than normal (11.33, 36.30, and 7.73 min, resp.) and were even higher for a 4-hr narcotane anesthesia. Hepatography, taken 2 hr after narcotane anesthesia, showed that liver function was unchanged in 73.33% of the animals in group 1, with disturbed excretion in 20%, and disturbed absorption and excretion in 6.67% of the experimental cases. But after 4-hr ether anesthesia, liver function changes were essentially milder, while anesthesia with petran and neuroleptanalgesics presented no evidence of liver function impairment.

8539 COPPER-INDUCED SYNTHESIS OF COPPER-CHELATIN IN RAT LIVER. (Eng.) Premakumar, R.; Winge, D. R.; Wiley, R. D.; Rajagopalan, K. V. (Dept. Biochemistry, Duke Univ. Medical Center, Durham, NC 27710). *Arch. Biochem. Biophys.* 170(1): 267-277; 1975.

The role of RNA and protein synthesis in the formation and accumulation of Cu chelatin in the rat liver was studied in male Sprague-Dawley rats injected i.p. with $CuCl_2$ (2.5 mg Cu/kg). The livers were excised and homogenized, and the soluble protein fractions were analyzed by Sephadex G-75 elution. Cu was quantitated by atomic absorption spectroscopy. $CuCl_2$ injection led to the accumulation of Cu chelatin in the liver; this low molecular weight, Cu-containing protein was not detected in significant quantities in the livers of control rats, even after the *in vitro* addition of Cu to the liver homogenates. In control liver preparations, the Sephadex G-75 eluate fraction corresponding to Cu chelatin failed to bind Cu under conditions in which the apochelatin was reconstituted with the metal. A marked increase in the incorporation of (4,5-^{3}H)-lysine into Cu chelatin was observed when the amino acid was used for pulse-labeling 5.5 hr after Cu injection. The administration of cycloheximide or actinomycin D (1.5 mg/kg) to the rats prior to Cu exposure inhibited the incorporation of radioactive lysine into Cu chelatin markedly; these drugs did not prevent the hepatic accumulation of the metal. Under these conditions, the extraneous Cu was associated with the major protein components, with no detectable increase in the Cu chelatin fraction. The incorporation of 5-^{3}H-orotic acid into liver RNA was elevated in the Cu-treated rats, and the Cu-stimulated labeling of the RNA was abolished by actinomycin D pretreatment. The results provide evidence for the induction by Cu of the synthesis of Cu chelatin by a mechanism involving transcriptional control.

8540 SH GROUPS IN LIVER MITOCHONDRIA FROM RATS WITH ALTERED COPPER CONTENT. (Eng.) Ivancheva, E. A.; Russanov, E. M. (Inst. Physiology, Bulgarian Acad. Sciences, Sofia, Bulgaria). *C. R. Acad. Bulg. Sci.* 28(7):975-977; 1975.

The number of sulfhydryl groups (-SH) in liver mit chondria was quantitated by experimentally alterin the copper content of the mitochondria of male Wis rats. Mitochondria with higher or reduced Cu contents were obtained from rats kept on a Cu-deficie or a Cu-loaded (40 mg/kg/day) diet for 8 weeks. Mitochondrial Cu content was also increased by inj ting Cu (100, 500, and 1,000, i.p.) in rats 10 min before sacrifice. The SH groups were determined after pretreatment of the mitochondria with 0.3 mg lubrol/mg protein. Control mitochondria contained mean levels of 0.21 nM Cu/mg protein and 71 nM -SH protein. The corresponding values in the experime tal animals were: 0.15 nM Cu/mg protein and 52.27 nM -SH/mg in Cu-deficient rats; 0.56 nM Cu/mg and 37.30 nM -SH/mg in Cu-deficient rats; 0.28 nM Cu/m and 36.68 nM -SH/mg in animals given 100 μg Cu, i. 0.45 nM Cu/mg and 46.63 nM -SH/mg in rats given 50 μg; and 0.54 nM Cu/mg and 25.86 nM -SH/mg in anima given 1,000 μg. The results indicate that Cu catalyzes the oxidation of only part of the SH groups, the "copper accessible" ones. The authors assume that the transport of Cu in the mitochondri *in vivo* is based on the same mechanisms of transfe that take place *in vitro*.

8541 ENDOCYTOSIS IN THE ISOLATED PERFUSED RAT LIVER, INDUCED BY CYTOCHALASIN B. (Eng. Jahn, W. (Max-Planck-Institut Fur Medizinische Forschung, Heidelberg, W. Germany). *Naturwissenschaften* 62(9):445-446; 1975.

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8573 THE DYNAMICS OF THE MEDIUM AMINO ACID COMPOSITION WHEN CULTURING THE ISOLATED KIDNEY AND LIVER BY THE CONTROLLED PERFUSION METHO (Rus.) Barashkov, V. A.; Gitelson, I. I.; Nefedov, V. P.; Trubachev, I. N. (Dept. Biophysics, L. V. Kirenskii Inst. Physics, Siberian Branch, SSSR Acad. Sciences, Krasnoiarsk, USSR). *Biull. Eksp. Biol. Med.* 80(11):36-38; 1975.

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L-FED RATS [Abstract]. (Eng.) Lostanlen, D.;
dea, M. C.; Godard-Launay, A. N.; Oudea, P. (UER
Medecine, Pathologie Cellulaire hepatique, ERA
RS 334, Nantes, France). *Digestion* 12(4/6):327-
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82 QUANTITATIVE ENZYME HISTOCHEMISTRY OF NORMAL AND INJURED LIVERS. PART I:
TRAMICROCHEMICAL AND HISTOCHEMICAL DISCREPANCIES
G6PD AND ICD ACTIVITY WITHIN THE HEPATIC LOBULE
CCl_4-INJURED LIVER OF RATS. (Eng.) Suzuki, K.
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8583 DECREASE IN THE LATENCY OF LYSOSOMAL ENZYMES AS AN INDICATION OF THE STRESS OF PERFUSING RAT LIVER. (Eng.) Lee, D.; Clark, D. G. (Univ. Otago Medical Sch., New Zealand). *Proc. Univ. Otaga Med. Sch.* 53(1):15-17; 1975.

8584 THE EFFECT OF ACTH AND SOME VITAMIN B_6 ANTIMETABOLITES ON TYROSINE AMINOTRANSFERASE ACTIVITY IN THE LIVERS OF INTACT AND HYPOPHYSECTOMIZED RATS. (Rus.) Matveeva, A. A.; Valueva, I. M.; Bukin, I. V. (Lab. Systemic Diseases of the Blood, Inst. Experimental and Clinical Oncology, USSR Acad. Medical Sciences, Moscow, USSR). *Probl. Endokrinol.* 21(5):73-76; 1975.

See also, 8429, 8454, 8458, 8501, 8612, 8790, 8915.

SECRETION AND METABOLISM

Intestine

85 THE PANETH CELLS: REGULATION OF SECRETION DURING REFEEDING IN THE MOUSE AND HAMSTER.
re.) Balas, D. (Laboratorie d'Histologi-Embryolo-
e, U.E.R. des Sciences Medicales-Purpan, F 31077
ulouse Cedex, France). *Arch. Anat. Microsc. Mor-
ol. Exp.* 63(4):307-322; 1974.

e secretory response of Paneth cells in mice and
msters after refeeding following starvation was
vestigated. In both species, refeeding elicited
gnificant premature degranulation within 15 min,
process that began before the feeding ended.
ximum secretion occurred within 40-50 min. Degran-
ation was 25%-45% in the mouse and 70% in the hams-
r. Regranulation occurred in two stages: a rapid
assembly of two-thirds of the granules within 20-
min and a subsequent gradual replenishment of
e remaining one-third. Even at maximum, no Paneth
ll group was completely depleted, and some cells
ssessed zymogen granules. The secretion was held
the glandular lumina by parallel filaments, after
mediate liquefaction. For both species the secre-
ry response was more significant in the caudal
rt of the jejunum, since the cells in the cranial
junum were degranulated more gradually. This
idence excludes a local effect of foodstuffs on
e mucosa. In animals with a pyloric ligature
ere was no degranulation. In animals with a duo-
nal ligation 1.5 cm below the common duct, degran-
ation was 35% in the mouse and 40% in the hamster.
granulation also occurred upon refeeding of vago-
mized or atropinized hamsters. The Paneth cell response is evidently a hormonal reflex triggered by the entry of foodstuffs into the duodenum.

8586 CHARACTERIZATION, DISTRIBUTION AND BIOSYNTHESIS OF THE MAJOR GANGLIOSIDE OF RAT INTESTINAL MUCOSA. (Eng.) Glickman, R. M.; Bouhours, J. F. (Dept. Medicine, Beth Israel Hosp., Boston, MA 02115). *Biochim. Biophys. Acta* 424(1): 17-25; 1976.

Studies on the characterization, distribution, and biosynthesis of the major ganglioside of the rat intestinal mucosa are reported. Thin layer chromatography of the aqueous phase after chloroform/methanol extraction of the whole mucosa revealed that the major ganglioside had a mobility similar to that of the hematoside GM_3 in both mucosa and purified brush border. This was further separated chromatographically into its upper and lower portions. After hydrolysis with neuraminidase, a lipid product which appeared to be lactosylceramide was yielded by both the upper and lower portions. The sialic acid liberated from the lower component was *N*-glycolylneuraminic acid, while the minor upper component contained *N*-acetylneuraminic acid as the scialic acid moiety. The major ganglioside contained no amino acid on gas liquid chromatography, but it contained glucose, galactose, and sialic acid in equimolar ratios, confirming its identity as the hematosis GM_3. The hematoside content of crypt cells was significantly less than that of villus cells. Determination of CMP-sialic acid:lactosylceramide sialyltransferase activity in differentiated villus and undifferentiated crypt cells indicated much less activity in the crypt cells. It is concluded that marked differences in ganglioside content and biosynthesis occur in contiguous populations of cells in varying states of differentiation in the normal rat intestine.

8587 GLYCEROLIPID BIOSYNTHESIS IN ISOLATED RAT INTESTINAL EPITHELIAL CELLS. (Eng.)

O'Doherty, P. J. A.; Kuksis, A. (Dept. Biochemistry, Univ. Wisconsin, Madison, WI 53706). *Can J. Biochem.* 53(9):1010-1019; 1975.

Glycerolipid biosynthesis was studied in isolated epithelial cells prepared from the intestinal mucosa of fasted male Wistar rats by collagenase dispersion. Cellular glycolytic activity was measured by estimating the production of lactic acid from glucose, and the biosynthesis of triacylglycerols and phospholipids was determined by incubating radioactive glycerol and glucose with micellar solutions of fatty acids and the isolated intestinal epithelial cells. The structural and metabolic integrity of the isolated cells was verified by electron microscopy, a high percentage of Trypan Blue exclusion, a low degree of lactate dehydrogenase release into the medium, and by the retention of sensitivity to agents known to modify metabolic and transport activity in everted sacs of intestinal mucosa. The isolated cells actively incorporated labeled glucose, glycerol, 2-monoacylglycerol, and free fatty acids into glycerolipids without specific cofactor requirements. The addition of free fatty acids stimulated the incorporation of both glucose and glycerol into triacylglycerols and glycerophospholipids, the greatest effect being observed with palmitate. The stimulation of monoacylglycerol acylation appeared to depend on the nature of both the monoacylglycerol and fatty acid supplied. Stereospecific analyses of the diacylglycerols formed from 2-monoacylglycerols and free fatty acids showed that 1,2-diacyl-*sn*-glycerols (62%-70%) were the major and 2,3-diacyl-*sn*-glycerols (30%-38%) were the minor intermediates in triacylglycerol biosynthesis. The data indicate that isolated intestinal epithelial cells exhibit a total capacity of glycerolipid synthesis and a stereochemical course of reaction comparable to those observed for triacylglycerol formation in everted intestinal mucosa sacs, but much less specific than those seen in microsomal preparations of intestinal mucosa.

8588 INTESTINAL GLYCOPROTEINS OF GERMFREE RATS. IV. OLIGOSACCHARIDES OBTAINED BY CHEMICAL DEGRADATION OF A WATER-SOLUBLE GLYCOPROTEIN FRACTION.

(Eng.) Wold, J. K.; Smestad, B.; Midtvedt, T. (Inst. Pharmacy, Univ. Oslo, Oslo 3, Norway). *Acta Chem. Scand.* [B]. 29(6):703-709; 1975.

The carbohydrate side chains of a recently characterized water-soluble glycoprotein fraction from the intestinal mucus of germfree rats were studied, using both an alkali-borohydride degradation procedur and acetolysis. The mucus was subjected to alkali treatment in the presence of excess borohydride, followed by separation of acidic and neutral oligosaccharides on an AG 1 formate ion exchange column. Further fractionation by gel chromatography, prepar ative paper chromatography, removal of the sialic acid residues, and subsequent treatment with alkali borohydride furnished an oligosaccharide mixture; after deionization of the mixture, the degraded material was fractionated on a Bio-Gel P-2 column, and final separation was achieved by preparative paper chromatography. Two oligosaccharides (I and II), in addition to *N*-acetylgalactosaminitol, were isolated. Periodate oxidation of the *N*-acetylgalactosaminitol, followed by sodium borohydride treat ment, gave 2-*N*-acetylamino-1,3-propanediol. Weak a hydrolysis of oligosaccharide I gave fucose and a c pound with the chromatographic mobility of oligosac charide II; subsequent incubation of this compound with β-galactosidase resulted in the liberation of lactose and *N*-acetylgalactosaminitol. Methyl iodid methylsulfinyl carbanion methylation of oligosaccharide I in dimethyl sulfoxide resulted in the pro duction of methylated sugars; these sugars were represented by three peaks on gas liquid chromatograms, having retention times of 1,5-di-*O*-acetyl-2, 3,4-tri-*O*-methylfucitol, and 1,2,5-tri-*O*-acetyl-3,4 tri-*O*-methylgalactitol. Further analysis of the ch matogram suggested this structure for oligosacchari I: *O*-α-L-fucopyranosyl-(1→2)-*O*-β-D-galactopyranosyl-(1→3)-2-deoxy-2-acetamido-D-galactitol. cubation of oligosaccharide II with β-galactosidase furnished galactose and *N*-acetylgalactosaminitol. Periodate oxidation of the disaccharide followed by sodium borohydride and mild acid hydrolysis led to total destruction of the galactose. The structure of oligosaccharide II was proposed to be *O*-β-D-galactopyranosyl-(1→3)-2-deoxy-2-acetamido-D-galactitol. When the intestinal glycoprotein was subjected to acetolysis and fractionation, the front peak contained high-molecular weight material; the middle one, oligosaccharides and glycopeptides; and the last peak, mostly monosaccharides. When the middle fraction was further fractionated, a disaccharide consisting of galactos and *N*-acetylglucosamine (oligosaccharide III) was present, in addition to other compounds. Oligosaccharide III was methylated, hydrolyzed, and the two component sugars were converted into their ald tol acetates and analyzed by gas-liquid chromatogra phy-mass spectrophotometry, suggesting the following structure for oligosaccharide III: *O*-β-D-galactopyranosyl-(1→4)-2-deoxy-2-acetamido-D-glucose. The results suggest that the molecular co stitution of the germfree rat intestinal mucus does not differ basically from that of other mucus glyco proteins.

8589 SECRETION OF PROTEOLYTIC ENZYMES FOLLOWI INTRODUCTION OF NUTRIENTS INTO THE DUODE AND JEJUNUM.

(Rus.) Berkos, O. V.; Schedrunov, V. V. (Lab. Digestion Physiology, I. P. Pavlov Inst. Physiology, Leningrad, USSR). *Vopr. Pitan.* (1):47- 50; 1976.

)0 RESPONSES OF THE SMALL INTESTINE TISSUE RECEPTORS TO CHANGES IN pCO_2, pH, AND HCO_3^- THE PERFUSION SOLUTIONS. (Rus.) Lebedeva, V. A.; ippova, L. V.; Chernigorskii, V. N. (I. P. Pavlov t. Physiology, USSR Acad. Sciences, Leningrad, R). *Fiziol. Zh. SSSR* 62(2):264-274; 1976.

)1 CHANGES IN THE SYMPATHETIC IMPULSATION AND RESPONSES OF THE INTESTINAL AND KIDNEY SELS IN PRESSOR REFLEXES. (Rus.) Vinogradova, I.; Makovskaia, V. A.; Tkachenko, B. I. (Inst. Experimental Medicine, USSR Acad. Medical Sciences, Leningrad, USSR). *Fiziol. Zh. SSSR* 62(2):246-253; 1976.

See also, 8446, 8450, 8470, 8494, 8600.

GENERAL

2 VALUE OF THE NEW EX VIVO "GASTRIC CHAMBER" TECHNIQUE IN STUDYING THE FRAGILITY OF THE GASTRIC MUCOSA. (Fre.) Labrid, C.; Dureng, G.; ro, Ch. (Departement de Pharmacodynamie, C.E.R.M., te de Marsat, 63201 Riom, France). *C. R. Soc. l. (Paris)* 169(3):566-573; 1975.

odification of the gastric chamber technique was d to estimate gastric mucosal fragility. Wistar s were laparotomized, a plexiglas chamber was erted between the pylorus and the distal esopha-, and hemostasis was secured. The mucosal effect perfusing a pH 2.8 disodium citrate-hydrochloric d mixture was not significantly different from t of a pH 2.0 potassium chloride-hydrochloric acid ture, and the effect of a pH 4.2 disodium citrate-rochloric acid mixture was not different from t of a neutral solution. A pH of 1.4 was unsuit-e. The outcome of phenylbutazone (PHB) pretreat-t (12.5-100 mg/kg, p.o.) was measured 30 min er administration. The effect of the pH 2.8 fusate was exacerbated by PHB. Neither the pH perfusate nor PHB (50 or 100 mg/kg) alone signif-ntly affected the gastric mucosa. A combined atment, however, elicited a significantly in-ased mucosal fragility (p=0.05). When PHB was ad-istered 6 hr before perfusion, maximum fragility achieved with the pH 2.8 perfusate; at 24 hr, re was no significant effect. These results con-m that PHB ulcerigenicity is not due to increased d secretion but rather to decreased mucosal re-tance.

)3 THE VALUE OF THERMOCOUPLE IN THE MEASURE-MENT OF THE GASTRIC MUCOSAL BLOOD-FLOW. INFLUENCE OF THE OCCLUSION OF THE CELIAC ARTERY) PROSTAGLANDIN E_1 ON THE GASTRIC MUCOSAL BLOOD W. AN EXPERIMENTAL STUDY IN ANIMALS. (Ger.) ch, H.; Demling, L. (Med. Klinik und Poliklinik Universitat, Postfach 3560, D-8520 Erlangen, W. rmany). *Res. Exp. Med.* 167(1):71-84; 1976.

relation between reduced gastric mucosal blood w and ulcer etiology, the extent of celiac artery constriction and perfusion or secretion in gastric mucosa, and the extent of prostaglandin E_1 impairment of celiac artery flow and its effect on gastric mucosa and secretion are examined. Thermocouples were inserted into the stomachs of hybrid cats at the level of the angle and were fixed to the anterior wall. Pentagastrin administration induced an average blood flow increase of 23-60%; according to increasing intake pressure, the increase occurred equally in the anterior and posterior walls and the two curvatures. All five measurement variables recorded the elevation within the 1st hr; within 30 min of supplementary vasopressin infusion, arterial blood flow registered an additional significant increase ($p<0.005$), while heat conduction ($p<0.05$), aminopurine clearance ($p<0.005$), volume of gastric secretion, and H^+-output ($0.05>p>0.01$) fell significantly. Partial constriction of the celiac artery led to proportional decreases in mucosal perfusion, as measured by all variables except volume and H^+-output, which were unaffected. Supplementary prostaglandin E_1 infusion (2 μg) induced significant increases in blood flow ($p<0.005$), which never returned to pre-prostaglandin E_1 levels after its interruption, and in gastric volume and H^+-secretion. Blood flow, volume, and H^+-output fell after 4 μg prostaglandin E_1; after 8 μg, blood flow increased slightly, and heat conduction, volume, and H^+-secretion decreased. The demands of ulcer therapy, inhibition of acid secretion and promotion of mucosal circulation, are not satisfied by prostaglandin E_1.

8594 ENTEROHEPATIC CIRCULATION OF INDOMETHACIN AND ITS ROLE IN INTESTINAL IRRITATION. (Eng.) Duggan, D. E.; Hooke, K. F.; Noll, R. M.; Kwan, K. C. (Merck Inst. Therapeutic Res., West Point, PA 19486). *Biochem. Pharmacol.* 25:1749-1754; 1975.

The accumulative biliary secretion of indomethacin and its conjugate(s), based on biliary clearance constants and areas under portal and peripheral plasma profiles, was determined in rats, guinea pigs, dogs, rabbits, and spider monkeys, and was estimated for man. ^{14}C-labeled indomethacin, desmethylindomethacin, desbenzoylindomethacin, and desmethyl desbenzoyl indomethacin were administered i.v. in the laboratory animals, and the plasma, biliary, and renal clearances were determined. The accumulative biliary secretion of indomethacin and its conjugates ranged approximately 30-fold, being 13% of the total dose in the rabbit, 21% in the guinea pig, 26% in the monkey, 134% in the rat, and 362% in the dog. This percentage provided a quantitative correlate to the wide species variation in sensitivity to indomethacin-related intestinal lesions; the minimum toxic dosages in rabbits, guinea pigs, monkeys, rats, and dogs were 20.0, 6.0, 1.0, 0.75, and 0.5 mg/kg/day, resp. Extrapolation of the accumulative biliary secretion of indomethacin and its conjugates versus the intestinal toxicity relation to man predicted a therapeutic ratio of approximately 20:1 with respect to intestinal irritation. The pharmacokinetic modeling derived for the present purpose should be of general utility in the quantitation of enterohepatic recycling of drugs or metabolites whose loci of intended or untoward effects include the liver or gut.

8595 MEASUREMENT OF LIVER BLOOD FLOW BY MEANS OF A SINGLE INJECTION OF BROMOSULPHTHALEIN, WITHOUT HEPATIC VENOUS CATHETERIZATION.

(Eng.) Clarkson, M. J.; Hardy-Smith, A.; Richards, T. G. (Liverpool Sch. Tropical Medicine, Pembroke Place, Liverpool L3 5QA, England). 51(2):141-150; 1976.

A method for the measurement of hepatic blood flow without catheterizing the hepatic vein is described. BSP is injected in a single dose and the time course of disappearance of the indicator from the circulation is analyzed. The method was tested in a physical model with a hemodialyzer, in dogs and in turkeys. The mean hepatic plasma flow in 10 anesthetized dogs was 30.7 ml/min/kg, which did not differ significantly from the flow rate determined by the classical Fick method (29.4 ml/min/kg). Since the mean packed cell volume of the blood from the dogs was 46.9, the mean hepatic blood flow was calculated to be 57.8 ml/min/kg. Among 15 unanesthetized turkeys, the mean hepatic plasma flow was 17.8 ml/min/kg, as determined by both methods. The mean packed cell volume was 42.5, so that the mean hepatic blood flow in the turkey was 31.0 ml/min/kg. The correlation coefficient for the new method and the Fick method in all test systems was 0.96. The method has been used in a variety of avian and mammalian species including man, and its use in physiological studies and in clinical medicine is suggested.

8596 BLOOD FLOW IN THE SMALL INTESTINE OF CAT AND MAN AS ANALYZED BY AN INERT GAS WASHOUT TECHNIQUE.

(Eng.) Hulten, L.; Jodal, M.; Lindhagen, J.; Lundgren, O. (Dept. Surgery II, Univ. Goteborg, Goteborg, Sweden). *Gastroenterology* 70 (1):45-51; 1976.

A recently developed ^{85}Kr elimination technique was used to study small intestinal blood flow and flow distribution in cats and in humans undergoing laparotomy for colonic cancer, ulcerative colitis, or Crohn's disease. In the cat at rest, the musculari blood flow was estimated at 14 ml/min/100 g, and the total venous outflow was estimated at 28 ml/min 100 g. The mucosal-submucosal blood flow amounted to 37 ml/min/100 g. It was calculated that 20% of the total blood flow was distributed to the muscula is and about 80% to the mucosal-submucosal layer. In the human studies, the jejunal blood flow was 44 ml/min/100 g, the ileal blood flow was 34 ml/min 100 g, and the total small intestinal blood flow wa 38 ml/min/100 g. The jejunal muscularis flow was 23 ml/min/100 g, and the ileal muscularis flow was 20 ml/min/100 g. The blood flow to the mucosa-submucosa was 61 ml/min/100 g. Flow distribution calculations revealed that 75% of the total blood flow was distributed to the mucosa-submucosa and 25% to the muscularis. The quantitative and qualitative similarities between feline and human intestinal ci culation are stressed.

8597 CHANGES IN THE BLOOD SUPPLY OF THE GASTRO INTESTINAL TRACT IN RATS WITH AGE.

(Eng. Varga, F.; Csaky, T. Z. (Medical Univ. Pecs, H-7640 Pecs, Hungary). *Pfluegers Arch.* 364(1);129-133; 19

To determine whether a blood supply gradient exists from the oral to the aboral end of the small intestine, regional blood flow of the gastrointestinal tract and cardiac output were determined in male Sprague-Dawley rats (30-726 g). The cardiac output was determined in 81 rats weighing 60-642 g. The body weight of the animals correlated with age, except in those weighing 500 g or more. Cardiac output in the 81 rats decreased with age in relativ value. An inverse linear relation was obtained between the logarithm of the cardiac output per kil gram body weight and the logarithm of the body weig The total wet weight of the alimentary tract was 5. of the body weight in 20- to 21-day-old rats and 6. in 25- to 28-day-old rats; the proportion declined larger animals, e.g., 1.95% in rats weighing 566 g. The fractional blood flow of the total gastrointestinal tract was highest in 20- to 21-day-old rats (21% of the total injected ^{86}Rb); this decreased markedly with age. During the weaning period, the blood flow to the fore and glandular stomach was significantly lower ($p<0.05$) than that to the distal parts of the gastrointestinal tract. There was no significant difference in the fraction blood flow of the small intestine, cecum, and large intestine in rats with an average body weight of 37.7 g. In rats weighing 65 g, the fractional bloo flow of the small intestine was 4.38%. This was significantly higher than that of the cecum (3.17%) but it did not differ significantly from the fractional blood flow of the large intestine (3.79%). In rats weighing 90 g or more, the fractional blood flow of both the cecum and the large intestine was significantly less than that of the small intestine There was no blood supply gradient within the small intestine of rats weighing 65 g or less. Such a gradient in the blood supply developed progressivel with age, and in rats age 6 months or older, the blood flow was significantly lower in the ileum tha in the jejunum.

98 EFFECT OF FASTING ON MUCOSAL BLOOD FLOW IN ANTRUM AND CORPUS OF THE STOMACH. (Eng.)

ylor, T. V.; Pullan, B. R.; Torrance, H. B. (Man-
ester Royal Infirmary, Manchester M13 9WL, England).
r. *Surg. Res.* 8(3):227-235; 1976.

stric mucosal blood flow rates for the antrum and
e corpus were studied in Wistar rats by means of
e ^{86}RbCl clearance technique, and the effects of
sting, food intake, and vagotomy on these flow
tes were determined. Directly after a meal, there
s a threefold increase in both antral and corpus
ow rates, the antral rate increasing from 3.24 to
.21 flow units and the corpus rate increasing from
35 to 7.09 flow units. With progressive fasting up
48 hr, there was a decrease in the mucosal perfu-
on to both antrum and corpus, the diminution of the
tral flow rate being more marked than that of the
rpus flow rate. In vagotomized animals, feeding
oduced a smaller increase in the mucosal flow to
th antrum and corpus: 8.01 flow units for the an-
um and 6.85 flow units for the corpus. It is sug-
sted that the antrum plays an active role in the
sponse to a physiological stimulus and may contri-
te to the control of parietal cell blood flow and
cretion.

99 KINETICS OF ESTABLISHING HUMAN FECAL FLORA IN GERM-FREE MICE AND TRIAL OF DECONTAMINA-
ON BY ANTIBIOTHERAPY. (Fre.)

Ghnassia, J. C.;
ron, M.; Ducluzeau, R.; Muller, M. C.; Raibaud, P.
aboratoire de Bacteriologie, Faculte de Medecine,
cker-Enfants Malades, 75730 Paris Cedex 15, France).
n. *Microbiol. (Paris)* 126(3):367-379; 1975.

attempt was made to establish an equilibrium of
e bacterial strains isolated from the gastrointes-
nal tract of a child in a plastic isolator in gno-
xenic C3H strain mice and to render the mice axenic
antibiotics. The bacterial strains (and the day
p.o. administration) included *Acinetobacter lwoffi*
), *Staphylococcus epidermidis* (7), *Clostridium*
rfringens (21), *Plectridium anatum* (54), *Strep-*
coccus bovis (54), *Corynebacterium* (54), *Bacillus*
cheniformis (109), and *Enterobacter cloacae* (122).
lwoffi proliferated in 24 hr from 10^5/g to 10^7/g.
epidermidis was established at a high level and
creased rapidly from 10^8/g to 10^4/g. The remain-
g strains remained relatively constant. At the
d of 6 weeks, *C. perfringens* was the dominant
ora (10^9/g), *P. anatum* was 10 times less abundant,
d *S. bovis* and the *Corneybacteria* were 100 times
ss abundant. Four of the six other strains disap-
ared within 24 hr of *B. licheniformis* and bacitra-
ne inoculation, except for low levels of *A. lwoffi*
d *S. epidermidis*. *B. lichenformis* became the domi-
nt flora. At day 116, *P. anatum* and *S. bovis*
appeared. At day 122, *E. cloacae* was injected
to the mice; it rapidly became the dominant flora
0^9/g), without altering the equilibrium, by arrest-
g bacitracine production. At day 198, the equilib-
um conditions in the mice were equivalent to those
the infant for *C. perfringens*, *P. anatum*, *E. cloa-*
e, and *S. bovis*. At sacrifice on day 292, the
ssue distributions (in log numbers of bacteria
r gram of organ) in the stomach, small intestine, cecum, and colon, resp., were 3, 5.3, 8.9, and 8.6 for *P. anatum;* 3.9, 5.3, 8.3, and 8.5 for *B. licheniformis;* and 6.6, 6.6, 8.8, and 9.2 for *E. cloacae*. Gnotoxenic mice proved to be a good experimental model because their bacterial equilibrium was comparable to that of the gastrointestinal tract of the child raised in a plastic incubator.

8600 THE PHARMACOLOGY OF ANAPHYLAXIS IN THE CHICKEN INTESTINE. (Eng.)

Chand, N.; Eyre, P. (Dept. Biomedical Sciences, Univ. Guelph, Guelph, Ontario N1G 2W1, Canada). *Br. J. Pharmacol* 57(3):399-408; 1976.

The Schultz-Dale reaction was investigated in circular smooth muscle strips of esophagus, crop, duodenum, jejunum, and ileum from actively sensitized chickens. To illustrate the possible nature of the principal chemical mediator(s) participating in anaphylaxis in the chicken intestine, known specific antagonists, together with nonsteroidal anti-inflammatory agents and some new anti-anaphylactic drugs, were included in the study. The chickens were sensitized either to bovine albumin or to horse plasma. All strips contracted in response to acetylcholine (threshold dose 10^{-10}-10^{-7} M); histamine (10^{-7} -10^{-4} M); 5-hydroxytryptamine (10^{-10}-10^{-4} M); prostaglandins E_1, E_2, and F_2; bradykinin, and bovine slow reacting substance of anaphylaxis (SRS-A). Marked seasonal and individual variations in the responsiveness of gut tissues to these exogenous agonists were noted. Tissues were measurably more sensitive to agonists in the spring and summer than in winter. Mepyramine (0.5-1.0 μl/mg) inhibited the contractions in the ileum, suggesting the existence of H_1-histamine receptors. Methysergide (0.2 and 2.0 μg/ml) blocked 5-hydroxytryptamine-induced contractions, demonstrating the preponderance of "D"-musculotropic tryptamine receptors. The failure of the selective receptor antagonists of acetylcholine, histamine, and 5-hydroxytryptamine (atropine, mepyramine, and methysergide) to modify the Schultz-Dale reaction suggested that aminergic mechanisms are not involved in this reaction. Partial to complete blockade of the Schultz-Dale reaction by a prostaglandin receptor antagonist (polyphloretin phosphate, PPP); prostaglandin synthetase inhibitors (sodium meclofenamate and phenylbutazone); inhibitors of synthesis and release of histamine and SRS-A [5,5-dimethyl-11-oxo-5H, 11H-(2)-benzopyrano(4,3-g)(1)benzopyran-9-carboxylic acid ethanolamine salt; 2-9-propoxyphenyl-8-azapurin-6-one; diethylcarbamazine citrate, and PPP] and an inhibitor of proteinases (apoprotein) strongly suggested the involvement of vasoactive lipids and polypeptides in the anaphylactic response of chicken ileum to specific antigen.

8601 EVOLUTION OF HYPERPLASIA, HYPERPLASTIC NODULES, AND CARCINOMAS OF THE LIVER INDUCED IN RATS BY N-2-FLUORENYL-DIACETAMIDE. (Eng.)

Reuber, M. D. (National Cancer Institute, Bethesda, MD 21044). *Gann Monogr. Cancer Res.* 17:301-342; 1975.

The results of studies on the evolution of hyperplasia, hyperplastic nodules, and liver carcinomas induced in rats by treatment with 0.025% *N*-2-fluorenyldiacetamide (FdiAA) are presented, together with a series of 68 histologic photographs. Eight to sixteen weeks of treatment with the carcinogen induced hyperplasia of the liver cells. If the carcinogen-containing diet was discontinued after 8 weeks of feeding, the hyperplastic foci disappeared within the 65-week observation period. If the treatment was continued for longer periods, hyperplasia began to appear as nodules of hyperplasia. Only a few areas progressed to nodules, whereas most developed degenerative changes in the cytoplasm. These nodules either remained as nodules or progressed to carcinomas and did not disappear or undergo diffuse degenerative changes. Hyperplastic nodules continued to grow, even though the carcinogenic stimulus was discontinued. The longer the feeding period, the faster the nodules grew. Areas of hyperplasia did not survive on transplantation to any site in an isologous host. Hyperplastic nodules survived and increased in size only following intrahepatic transplantation to isologous hosts. The cells eventually developed degenerative cytoplasmic changes and did not progress to carcinoma. Transplanted carcinomas of less than 5 mm that had well differentiated cells progressed to well differentiated carcinomas only in the liver in which they developed; when transplanted to the liver of isologous hosts, they grew only as small hepatocellular carcinomas. Small carcinomas with poorly differentiated cells grew both autologously and isologously in the spleen, muscle, and subcutaneous tissue. Carcinomas 1.0 cm or larger either remained the same size or increased when transplanted in the liver, lungs, spleen, peritoneum, muscle, and subcutaneous tissues. Undifferentiated large carcinomas grew rapidly, whereas well-differentiated carcinomas grew slowly, and the growth of poorly differentiated carcinomas was intermediate. The transplantable carcinomas grossly and microscopically resembled the primary carcinomas in early generation transplants; however, in later generation transplants, the morphology and growth rates of well differentiated carcinomas resembled those of poorly differentiated carcinomas. Cirrhosis appeared at the same time as areas of parenchymal cell hyperplasia and progressed during the period of carcinogen feeding. After withdrawal of the carcinogen, the same hyperplastic lesions continued to progress, whereas the cirrhotic changes regressed and at death were often minimal and focal. In the progress of neoplasia, there is a gradual transition from the state of dependency toward one of autonomy.

8602 HEPATOMA, HOST LIVER, AND NORMAL RAT LIVER PHOSPHOLIPIDS AS AFFECTED BY DIET. (Eng.)

Wood, R. (Univ. Missouri Sch. Medicine, Columbia, MO 65201). *Lipids* 10(12):736-745; 1975.

Individual phospholipid classes derived from hepatoma 7288CTC, normal rat liver, and host liver of animals maintained on chow and fat-free diets were examined in detail, and the sphingomyelin and phosphoglyceride structures were compared. The percentages of most phospholipid classes in normal and host livers were essentially the same, and diet had little or no effect. Host livers from rats on the fat-free diet contained about 50% or less phosphatidylcholine (PC), phosphatidylinositol (PI), phosphatidylserine (PS), and diphosphatidylglycerol (DPG) than did normal livers of animals on both diets and host livers of chow-fed rats. Hepatoma sphingomyelin (SPH) concentrations (14.5% in chow-fed, 17.7% in fat-free diet-fed animals) were higher than those in the other groups (3.1, 3.2, 4.6, and 4.0% in normal livers of chow-fed rats, normal livers of fat-free, host livers of chow-fed, and host livers of fat-free rats, resp.). The concentrations of all other phospholipid classes [PC, PI, PS, DPG, phosphatidylethanolamine (PE), and lysophosphatidylcholine (Lyso-PC)] were lower in the hepatomas than in the other groups Hepatoma PC and PE concentrations were only 25 and 50% of liver levels, resp. The 1-position of all hepatic PC exhibited the same fatty acid composition 41% was composed of 16:0, and 56.6% was composed of 18:0. Host and normal liver PE were similar at the 1-position and contained primarily palmitate and stearate. The 1-position of hepatoma PE, affected little by diet, contained only 25-35% as much palmitate as liver PE. Polyunsaturated fatty acids dominated the 2-position of PC and PE of livers, but not of the hepatoma. Generally, the 2-position of PC and PE in host and normal liver from animals on the same diet was similar. However, the fat-free diet reduced the percentage of 18:2 in liver DPG 3-fold, and the decrease was offset by increased percentages of 16:1 and 18:1. The low percentage of 18:2 in hepatoma DPG was offset by increased percentages of 18:0 and 16:0. Liver PI and PC from the rats fed the fat-free diet contained the highest percentage, 20:3, which replaced 20:4. Hepatoma SPH contained a higher concentration of 24:0 and 24:1 than liver. The SPH also contained a C-24 dienoic acid, which was not detected in host and normal liver. Host liver contained a higher percentage of 22:6 than normal liver. Diglycerides derived from host liver PC contained significantly more ^{38}C than normal liver. Diglycerides from hepatoma PC and PE exhibited a 1-random-2-random distribution of fatty acids, whereas diglycerides from liver PC and PE showed pairing of specific fatty acids.

8603 CHOLESTATIC EFFECTS OF Escherichia coli ENDOTOXIN [sic] ENDOTOXIN ON THE ISOLATED PERFUSED RAT LIVER. (Eng.)

Utili, R.; Abernathy, C. O.; Zimmerman, H. J. (First Medical Sch., Univ. Naples, Naples, Italy). *Gastroenterology* 70(2): 248-253; 1976.

The effects of *Escherichia coli* endotoxin on the rates of bile flow and dye excretion were studied in isolated rat livers. At 0.5 mg/100 ml, endotoxin did not affect the rate of bile flow, but at 1 and 2 mg/100 ml, the rate was reduced by 18 and 27%, resp. Clearance of BSP was significantly reduced by 0.5 mg/100 ml, when dye excretion was expressed on the basis of liver weight ($p<0.05$), and the half-life of BSP in the perfusate was increased by 25%. At 1 mg/100 ml, endotoxin reduced BSP excretion even more ($p<0.001$), and this effect was greater with 2 mg/100 ml. The half-life of BSP was increased by and 64%, resp., by 1 and 2 mg of endotoxin/100 ml. e perfusate flow rate was decreased 6-8, 16, and %, resp., by 0.5, 1, and 2 mg endotoxin/100 ml. chanical reduction of the perfusate flow rate did t significantly decrease BSP excretion. The amount indocyanine green excreted by the perfused livers s significantly decreased when the perfusate con- ined 1 mg endotoxin/100 ml ($p<0.001$), but the half fe of this dye was not affected. At 0.5 and 1 mg/ 0 ml, endotoxin did not affect the release of GOT om the perfused livers, but a significant increase <0.05) occurred with 2 mg/100 ml. The release of T was not affected by any of the concentrations of dotoxin. The exposure of isolated hepatocytes to dotoxin (0.5-5 mg/100 ml) did not result in any akage of GOT from the cells. Kinetic data sugges- d that the effects of endotoxin were on the cretory mechanisms of the hepatocyte.

504 PORTAL HYPERTENSION AND GASTRIC LESIONS IN THE RAT. (Eng.) Phelps, T. O.; Mul- ane, J. F. (Dept. Biological Sciences, Wright tate Univ., Dayton, OH). *Arch. Surg.* 111(2):190- 94; 1976.

e effect of portal hypertension without jaundice the incidence of spontaneous and restraint-induced astric lesions was studied in rats. Portal vein onstriction (PVC) was accomplished by ligating the ortal vein against a hypodermic needle, which was hen removed. Measurements were carried out 2, 4, 7, nd 14 days after surgery in PVC and sham-operated nimals. Restrained animals were confined in wire esh sheets for 7 hr. Unrestrained rats with portal ypertension of 4 days' duration had a higher inci- ence of grade 1 lesions than did sham-operated rats. estrained PVC rats had a higher incidence of grade and 2 gastric lesions at 2, 4, and 7 days than did estrained sham-operated animals. Vagotomy and yloroplasty performed at the time of PVC protected he stomach from forming gastric lesions associated ith stress ($p<0.05$ for both grade 1 and 2 lesions). ortal pressures were significantly higher in rats ith PVC than in sham-operated rats immediately $p<0.001$) and at 4 days ($p<0.001$), while the portal ressures of the two groups were similar at 7 and 4 days postoperatively. SGOT and blood ammonia ere significantly increased ($p<0.01$ and 0.02, resp.) n PVC rats, but serum bilirubin and alkaline phos- hatase levels were similar in the two groups. Pro- hrombin time, partial prothrombin time, and fibri- ogen were not statistically different on the 4th ay, but the platelet count was significantly dec- eased in PVC rats ($p<0.001$) and in PVC-splenectom- zed rats ($p<0.05$). Gastric luminal oxygen pressure as decreased on day 2 after PVC, but was normal hereafter. PVC rats had a postoperative respiratory lkalosis. Four days after surgery, the gastric ecretion volume, acid concentration, and total acid ontent were similar in both PVC and sham-operated nimals. Except for venous congestion in rats with ortal hypertension, sham and PVC rats had similar orphology of the gastric epithelium in noneroded reas. PVC rats gained less weight than sham- perated rats. It is concluded that gastric conges- ion, weight loss, and possibly portasystemic shunting contributed to the higher incidence of gastric erosions with portal hypertension.

8605 A NEW MODEL OF STRESS ULCER IN THE RAT WITH PYLORUS LIGATION AND ITS PATHOGENESIS. (Eng.) Takeuchi, K.; Okabe, S.; Takagi, K. (Dept. Chemical Pharmacology, Univ. Tokyo, 7-3-1 Hongo, Bunkyo, Tokyo, Japan 113). *Am. J. Dig. Dis.* 21(9): 782-788; 1976.

Stress ulcers were produced in intact and pylorus-ligated male Donryu rats by water immersion stress, and the effects of various drugs and vagotomy on the newly developed ulcers were examined to clarify the mechanisms of formation. In intact rats immersed in water for 7, 14, or 20 hr, elongated ulcers, varying between 2 and 12 mm in length, or punctate ulcers developed only in the corpus. The mean ulcer index was highest after 7 hr of stress (59.9). When the pylorus was ligated prior to stress, the ulcers occurred in both the corpus and the antrum, and the morphological features were altered. The lesions were multiple, punctate, and superficial. The rhombic-shaped lesions that developed in the proximal antrum revealed a high incidence (50-70% of stressed, pylorus-ligated animals) of penetration into the muscularis mucosa. In the pylorus-ligated rats, the development of ulcers increased with time. After more than 14 hr ligation, several gastric Shay ulcers occurred in the forestomach in both normal and stressed rats. Gastric secretion was suppressed in the stressed pylorus-ligated animals. Stress ulcers observed in intact rats were not aggravated by pylorus ligation. The administration of sodium bicarbonate (83.3, 250, and 750 mg/kg, p.o.) and other drugs that reduce gastric secretion, such as chlorpromazine (20 mg/kg, s.c.), hexamethonium (20 and 40 mg/kg, s.c.), atropine (5 and 15 mg/kg, s.c.), and metiamide (12.5, 50, and 100 mg/kg, i.p.) inhibited the development of stress ulcers in pylorus-ligated rats. Inhibition by sodium bicarbonate was 49.5, 83.6, and 99.7% at the doses given, resp.; by chlorpromazine, 95.8%; by hexamethonium, 54.6 and 87.5%, resp.; by atropine, 98.2 and 100%, resp.; and by metiamide, 34.9, 69.1, and 74.9%, resp. Bilateral vagotomy also decreased the incidence of ulcers by 92.4%. The administration of amylopectine sulfate (100 or 200 mg/kg) reduced gastic acidity and peptic activity and changed the punctate stress ulcers to elongated lesions. A voluminous precipitate observed in the gastric contents suggested that amylopectine might combine with some mucosal substance and remove it from the gastric surface into the lumen under stress. Thus, the lowered function of so-called mucosal defensive factor appeared to contribute to the pathogenesis of amylopectine-induced ulcers. This model appears to be useful in the study of peptic ulcer diseases.

8606 FOREIGN SERUM-INDUCED PANCREATITIS IN MICE. I. A NEW MODEL OF ACUTE PANCREATITIS. (Eng.) Janigan, D. T.; Nevalainen, T. J.; MacAulay, M. A.; Vethamany, V. G. (Dept. Pathology and Anatomy, Dalhousie Univ., Halifax, Nova Scotia, Canada). *Lab. Invest.* 33(6):591-607; 1975.

The chance observation that acute pancreatitis rapidly develops in mice after the i.p. injection of fresh human, sheep, or rabbit serum is reported. Within 1-2 hr after one injection of fresh human serum by the intraperitoneal route only, male C57BL/10J mice developed pancreatic acinar cell necrosis and inflammation, fat necrosis, elevated serum amylase, and a shocklike state. The extent of these lesions and mortalities was roughly dose-dependent (0-1.5 ml human sera) and was not noticeably modified by either different fasting cycles or pilocarpine. Acinar cell changes and necrosis usually developed first in subserosal acini. The earliest ultrastructural change detected was nonspecific swelling of cytoplasmic compartments, which was reversible but also preceded the cytoplasmic degradation that developed in cells undergoing necrosis. Notably, zymogen granule dissolution neither preceded nor accompanied this swelling, but developed *pari passu* with cell degradation. Serum was cytotoxic for isolated acinar cells *in vitro*, even in the presence of soybean trypsin inhibitor. These results indicate that the injury mechanism *in vivo* is directly initiated through contact of serum with acinar cell surfaces and is independent of zymogen secretions and trypsin activation. They suggest that a rapid disturbance in cell membrane permeability results, the magnitude of which being the primary determinant of cell death. Pancreatic toxicity of human serum was abolished by aging, heating, EDTA, heparin, zymosan, cobra venom factor, and absorptions with mouse RBC against which fresh, unabsorbed serum was hemolytic. Pancreatic toxicity *in vitro*, and to a much lesser extent *in vivo*, was reconstituted by combining the RBC-absorbed serum with either heated serum, or with immunoglobulin M (IgM)-enriched, but not IgG serum fractions. Fresh cord serum was virtually nontoxic and could substitute for absorbed serum in such reconstitutions. These results indicate that the injury mechanism involves at least two serum components. Other results and a review of other examples of foreign sera toxicity suggest that they are components of a complement-dependent, cytotoxic heterophile antibody system. This phenomenon offers a simple model of acute pancreatitis, contributes to the debunking of traditional notions of the pivotal role of zymogens in the initiation of acute pancreatitis, and hints at a potential pathogenetic connection between pancreatitis and products of immune or related reactions.

8607 HEPATIC FUNCTIONAL DETERIORATION AFTER PORTACAVAL SHUNT IN THE RAT. EFFECTS ON SULFOBROMOPHTHALEIN TRANSPORT-MAXIMUM, INDOCYANINE GREEN CLEARANCE AND GALACTOSE ELIMINATION CAPACITY.

(Eng.) Lauterburg, B. H.; Sautter, V.; Preisig, R.; Bircher, J. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Gastroenterology* 71(2): 221-227; 1976.

The consequences of portacaval shunt on metabolic and excretory liver function were studied 12-16 days following end-to-side portacaval anastomosis in male Sprague-Dawley rats. Fourteen days after the procedure, the galactose elimination capacity (GEC) and the plasma clearance of indocyanine green (ICG) were reduced in proportion to the approximately 50% loss in liver mass; the mean control liver weig GEC, and ICG clearance were 4.0-4.2 g/100 g, 2.30-2.52 μmol/min/100 g (or 0.58-0.61 μmol/min/g liver) and 0.84 ml/min/100 g (or 0.21 ml/min/g liver), res The biliary transport maximum for BSP decreased by almost 70%, from 153 to 52 nmol/min/100 g after por caval anastomosis. This reduction was accompanied by a significant decrease in the hepatic conjugatio of the dye to glutathione. These results demonstra that a quantitative and qualitative functional deterioration of previously normal livers results from portal blood deprivation.

8608 ESOPHAGEAL, GASTRIC AND DUODENAL MUCOSA POTENTIAL IN THE NORMAL SUBJECT. (Ita.)

Barbara, L.; Miglioli, M.; Baldi, F.; Di Febo, G.; Lami, F.; Biasco, G. (Gastroenterology Service, Univ. Bologna, Bologna, Italy). *Minerva Gastroenterol.* 21(4):184-188; 1975.

8609 DISTRIBUTION OF GUT HORMONES [Abstract].

(Eng.) Bloom, S. R.; Bryant, M. G.; Pola J. M. (Royal Postgraduate Medical Sch., London, England). *Gut* 16(10):821; 1975.

8610 EFFECTS OF CHARCOAL HAEMOPERFUSION ON PLATELET FUNCTION AND AGGREGATE FORMATION

[Abstract]. (Eng.) Weston, M. J.; Langley, P. G.; Mellon, P. J.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 12(4/6):359-360; 1975.

8611 HOMOGENEITY OF SINUSOIDAL PERFUSION RATES IN THE CAT'S LIVER [Abstract]. (Eng.)

Krarup, N.; Larsen, J. A.; Munck, A. (Inst. Physiology, Univ. Aarhus, Aarhus, Denmark). *Digestion* 12(4/6):321; 1975.

8612 CHOLIC ACID AND BILIRUBIN METABOLISM BY INTESTINAL FLORA [Abstract]. (Eng.)

Fukushima, K.; Odagiri, S.; Tarao, K.; Shindo, K.; Yamazaki, T.; Ohara, K.; Endo, O. (Yokohama City Univ. Sch. Medicine, Yokohama, Japan). *Jpn. J. Me* 14(2):119-120; 1975.

8613 LONG-TERM MONOLAYER CULTURES OF HEPATOCYTES [Abstract]. (Eng.)

Junge, U.; Nagamori, S.; Winckler, K.; Brunner, G.; Soling, H. D. (Dept. Medicine, Univ. Gottingen, Gottingen, Netherlands). *Digestion* 12(4/6):317; 1975.

8614 INFLUENCE OF CLOFIBRATE (ETHYLCHLOROPHENOXYISOBUTYRATE) ON HEPATIC Z PROTEIN IN RATS [Abstract].

(Eng.) Foliot, A.; Housset, E.; Fiessinger, J.-N.; Christoforov, B.; Petite, J.-P. (Unite de Recherches de Biologie animale et Techniques experimentales, U-36, INSERM, Paris, France) *Digestion* 12(4/6):256-257; 1975.

15 COLCHICINE INHIBITS FIBRINOGEN TRANSLOCATION IN THE ENDOPLASMIC RETICULUM OF THE PATOCYTES [Abstract]. (Eng.) Feldmann, G.; urice, M. (Hopital Beaujon, Clichy, France). *gestion* 12(4/6):249; 1975.

16 HEPATOCELLULAR HYALIN (MALLORY BODIES MB) IN LONG-TERM GRISEOFULVIN-TREATED MICE: NEW EXPERIMENTAL MODEL FOR THE STUDY OF HYALINE RMATION [Abstract]. (Eng.) Denk, H.; Gschnait, ; Wolff, K. (Univ. Vienna Sch. Medicine, Vienna, stria). *Digestion* 12(4/6):298; 1975.

17 METABOLISM IN VITRO AND METABOLIC CLEARANCE OF TOLBUTAMIDE IN VIVO IN RATS SUFFERG FROM EXPERIMENTAL CHOLESTASIS [Abstract]. (Eng.) lhelm, T.; Gallenkamp, H.; Zilly, W.; Richter, E. ept. Internal Medicine, Univ. Wurzburg, Wurzburg, Germany). *Digestion* 12(4/6):360-361; 1975.

18 STUDIES ON HEPATIC UPTAKE AND SECRETION OF BILE SALT SULFATES BY THE ISOLATED RFUSED RAT LIVER [Abstract]. (Eng.) Liersch, M.; ygan, P.; Stiehl, A. (Medical Clinic, Univ. Heilberg, Heidelberg, W. Germany). *Digestion* 12 /6):326-327; 1975.

19 THE EFFECT OF PORTAL VENOUS DEVIATION ON THE REGENERATIVE CAPACITY OF THE LIVER TER PARTIAL HEPATECTOMY: AN ELECTRON-MICROSCOPIC UDY. (Eng.) Marks, C.; Markey, C. (Lousiana ate Univ. Sch. Medicine, 1542 Tulane Ave., New leans, LA 70112). *Chir. Gastroenterol.* 9(4): 3-502; 1975.

20 EFFECTS OF HEPATIC ARTERIALIZATION, UDPG TREATMENT ON GLUCURONYLTRANSFERASE ACTIVY IN RATS WITH PORTACAVAL SHUNT [Abstract]. (Eng.) olicsanyi, L.; Vassanelli, P.; Asquini, A.; Merigano, S. (Istituto Clinica Medica I., Univ. di adova, Padova, Italy). *Digestion* 12(4/6):336; 75.

21 ALCOHOLIC LIVER INJURY IN BABOONS: CYTOTOXICITY OF LYMPHOCYTES [Abstract]. (Eng.) aronetto, F.; Lieber, C. S. (Bronx Veterans Admin. sp., New York, NY). *Clin. Res.* 24(3):434A; 1976.

8622 A LAST SHOWDOWN WITH "BIG, BIG GASTRIN" [Abstract]. (Eng.) Rehfeld, J. F.; Schwartz, T. (No affiliation given). *Acta Hepatogastroenterol. (Stuttg.)* 22(6):421-422; 1975.

8623 EFFECT OF L-CARNOSINE (N-2-M) ON EXPERIMENTAL GASTRIC ULCER. (Jpn.) Yamakawa, A. (Showa, Univ. Sch. Medicine, Showa, Japan). *J. Showa Med. Assoc.* 35(12):113-122; 1975.

8624 SQUAMOUS METAPLASIA IN THE HEALING OF CHRONIC COLONIC ULCERS OF THE RAT. (Eng.) Reeve, D. R. E. (Royal Coll. Surgeons England, Lincoln's Inn Fields, London, WC2A 3PN, England). *J. Pathol.* 117(1):15-22; 1975.

8625 THE ROLE OF Vibrio cholerae NEURAMINIDASE IN THE PATHOGENESIS OF EXPERIMENTAL CHOLERA. (Rus.) Soloviev, V. D.; Kobrinsky, G. D.; Galtseva, G. V.; Sayamov, R. M. (Scientific Res. Lab. Experimental Immunobiology, USSR Acad. Medical Sciences, USSR). *Zh. Mikrobiol. Epidemiol. Immunobiol.* (5): 94-99; 1975.

8626 STUDIES ON THE ACTION OF CHOLERA TOXIN [Abstract]. (Eng.) Flores, J.; Sharp, G. W. G. (Massachusetts General Hosp., Boston, MA). *Digestion* 13(1/2):109-110; 1975.

8627 CELLULAR KINETICS OF THE INTESTINAL IMMUNE RESPONSE TO CHOLERA TOXOID IN RATS. (Eng.) Pierce, N. F.; Gowans, J. L. (Baltimore City Hosp., 4940 Eastern Ave., Baltimore, MD 21224). *J. Exp. Med.* 142(6):1550-1563; 1975.

See also, 8431, 8480, 8508, 8584, 8642, 8787.

DIAGNOSTIC PROCEDURES

8628 CLINICAL SIGNIFICANCE OF THE ^{14}C-GLYCOCHOLATE BREATH TEST IN THE DIAGNOSIS OF GASTROENTEROLOGICAL DISEASES. (Ger.) Caspary, W. F.; Reimold, W. V. (Abteilung Gastroenterologie und Stoffwechselerkrankungen, Medizinische Klinik und Poliklinik der Universitat, 3400 Gottingen, Humboldtallee 1, W. Germany). *Dtsch. Med. Wochenschr.* 101 (10):353-360; 1976.

The role of the oral ^{14}C-glycocholate breath test (GBT) in detecting the cause of diarrhea and steatorrhea in syndromes with increased bacterial deconjugation of bile acids was examined. In 15 patients without gastrointestinal disease, the GBT was normal. In 2 of 2 ileus cases, 8 of 12 diabetic neurogastroenteropathies, and 4 of 4 scleroderma patients, however, the test was abnormal (elevated $^{14}CO_2$). The ratios after various surgical corrections were as follows: gastric resection (Billroth II), 13 of 24; total gastrectomy, 4 of 4; duodenopancreatectomy, 5 of 5; small and large bowel fistulation, 9 of 12; afferent loop syndrome, 1 of 1; duodenal diverticulitis, 1 of 2; ileum resection (<100 cm), 6 of 8; ileum resection (>100 cm), 5 of 5; and colectomy, 0 of 3. In chologenic and other diarrheas, the following were found: *Salmonella* enteritis, 0 of 1; laxative abuse, 0 of 1; nonspecific enteritis, 1 of 2; irritable colon syndrome, 1 of 6; Whipple's disease, 0 of 2; sprue, 0 of 7; Crohn's disease, 6 of 12; ulcerative colitis, 0 of 7; intestinal amyloidosis, 1 of 1; Verner-Morrison syndrome, 1 of 1; and pancreatic insufficiency, 0 of 9. Excluding the normal group, the total quotient was 68 of 134. The site of bile acid deconjugation can be predicted by determining the delay time in reaching maximal expiratory levels.

8629 STUDIES OF THE DIAGNOSTIC AND PROGNOSTIC POTENTIAL OF IMMUNOLOGICAL TESTS FOR ECHINOCOCCOSIS. (Ger.) Todoroff, T.; Yurukova, D. (Medizinische Akademie, Lehrstuhl fur Epidemiologie und Parasitologie, Sofia 31, Bulgaria). *Zentralbl. Bakteriol.* [*Orig. A*] 228(3):402-413; 1974.

The diagnostic and prognostic value of complement fixation, indirect hemagglutination, and latex agglutination in echinococcosis infection was assayed. Sera from 118 affected patients was drawn preoperatively and in 22 cases, 10-32 months postoperatively. The highest percent of positive sera was harvested by indirect hemagglutination (88%), followed by latex agglutination (85%), and complement (81%). Positive results with liver echinococcosis were significantly higher than in lung echinococcosis. Indirect hemagglutination was 97% sensitive to liver echinococcosis, with complement fixtation at 87% and latex agglutination at 88%. In specificity tests in 97 healthy persons, all sera showed negative latex agglutination and indirect hemagglutination, and 4 were weakly complement fixation positive; the nonspecific complement fixation reaction impairs its diagnostic value. The three tests correlated qualitatively in 75.5-82.3% of the positive and 6.8% of the negative results. The highest positive correlation was in liver infection (85.7%). Paired correlations found latex agglutination and indirect hemagglutination at 72.2%, complement fixation and latex agglutination at 53.4%, and complement fixation and indirect hemagglutination at 47.5%. The quantitative correlation between indirect hemagglutination and latex agglutination was higher than that between the three values. All secondary echinococcoses reacted positively to the tests. The average values were five times higher in complement fixation and six to eight times higher in indirect hemagglutination and latex agglutination than with primary infection, probably due to secondary antibody formation. Postoperative followups found a decrease in titer or disappearance of antibodies in 18 of 22 patients. By immunologic examination of the postoperative development of the disease, a prognosis may be given by estimating the persistance, decrease, or disappearance of antibody during the postoperative period.

8630 ACCIDENTS DUE TO DUODENOSCOPIC CATHETERIZATION OF THE AMPULLA OF VATER. NATIONAL INQUIRY CARRIED OUT ON 2,819 CASES. (Fre.) Jeanpierre, R.; Gaucher, P.; Laurent, J. X.; Vicari, F.; Heully, F. (CHU, Hopital Brabois, 54037 Nancy Cedex, France). *Ann. Gastroenterol. Hepatol.* 12(3):185-188; 1976.

A statistical survey of accidents due to perduodenoscopy of the ampulla of Vater is reported. There was 113 accidents in 2,819 duodenoscopic catheterizations, and 13 of 113 were fatal. The accidents were caused by premedication (7 cases, 2 deaths), the endoscopic technique (6 cases, 1 death), retrograde cholangiography (52 cases 10 deaths), and wirsungography, which lead to acute pancreatitis (48 cases, 0 deaths). In the premedication cases, neuroleptic analgesia induced respiratory depression plus apnea, leading to rapid collapse in two patients. The endoscope, perhaps stimulating hypotonia, was responsible for six duodenal perforations, five of which were surgically correctable; no gastric or pharyngoesophageal perforations occurred. The majority of the cholangiographic accidents were of infectious origin: simple angiocholitis (40 cases, 3 deaths), icterouremigenic angiocholitis (8 cases, 6 deaths), or cholecystitis (3 cases). In one patient the contrast medium was responsible. The wirsungographi accidents were associated with the host response, leading to elevated urinary and serum amylases and acute pancreatitis. The latter occurred in all 48 of the affected patients; medical correction was possible in 39, but surgical intervention was required in 9. The number of catheterizations and the amount, temperature, concentration, and antibiotic composition of the contrast medium are factors to be considered.

8631 ON THE DYE SPRAYING METHOD IN COLONOFIBERSCOPY. (Eng.) Tada, M.; Katoh, S.; Kohli Y.; Kawai, K. (Kyoto Prefectural Univ., Kawaramachi-Hirokoji, Kyoto, Japan). *Endoscopy* 8(2):70-74; 1976

The diagnostic value of the dye spraying method in colonofiberscopy was assessed in 11 patients with normal colonic mucosa and in 26 patients with ulcer-

ive colitis. Indicarmine or methylene blue was
ed for spraying. In all normal patients in whom
e spraying with indicarmine was undertaken, oval,
indle, or mixed fine mucosal changes were seen;
e spindle form was encountered in 51.8% of the
ses, the oval form in 20.5%, and the mixed forms
27.7%. The spindle forms decreased in frequency
th age, while the mixed and oval forms increased
th age. Endoscopic examinations (101) were under-
ken after dye spraying with indicarmine in 22
tients with ulcerative colitis. In 12 of these
aminations, the stage of colitis was determined
be grade III (course and asymmetrical features
companied by erosions or ulcerations); in 38
aminations, the stage was grade II (irregular
d asymmetrical features without erosion or ulcer-
ion); in 38 cases, the stage was grade I (almost
rmally arranged spindle or oval fine structures,
t sporadic small depressions in the mucosa); and
13 cases, the mucosa was normal. Clinically, all
ses of grade III and 31.6% of the grade II cases
d colitis in the active phase, and the remaining
se had quiecent phase colitis. When 0.1% methyl-
e blue was used for spraying, the degree of stain-
g was correlated with the disease stages. Ninety
rcent of the cases with active disease had unstain-
mucosa, and 57.1% of the cases with active disease
d slightly stained mucosa. Ten percent of the
tients with mucosa in the healing process had
stained mucosa, 42.9% had slightly stained mucosa,
d 26.5% had well stained mucosa; 73.5% of the cases
th normal mucosa had well stained mucosa. Indi-
rmine or methylene blue dye spraying in colonofiber-
opy may be useful in determining the disease stage
ulcerative colitis.

532 EVALUATION OF ESOPHAGEAL TESTS IN THE
DIAGNOSIS OF REFLUX ESOPHAGITIS. (Eng.)
ehar, J.; Biancani, P.; Sheahan, D. G. (Veterans
dmin. Hosp., West Haven, CT 06516). *Gastroenterol-*
gy 71(1):9-15; 1976.

he sensitivity and specificity of each of five
sophageal tests used in the diagnosis of reflux
sophagitis were compared with those of six combin-
tions of two tests, one indicating esophagitis and
he other indicating sphincter incompetence. The
sophageal tests were performed in 77 men with re-
lux symptoms, 11 men with chest pain, and 12 men
nd 1 woman with esophagitis without reflux symp-
oms. The results of the acid infusion test were
ignificantly different from those in normal sub-
ects only in patients with chest pain ($p<0.001$).
ultiple biopsy specimens showed the incidence of
istological abnormalities to be significantly dif-
erent in patients with duodenal ulcer ($p<0.02$) and
eflux symptoms ($p<0.001$) than that in control sub-
ects. The mean resting lower esophageal sphincter
ressure of patients with reflux symptoms was sig-
ificantly lower than that of all other subjects
$p<0.001$). The acid infusion test and esophageal
iopsy combined with esophageal pH study after HCl
eflux showed similar sensitivity to and greater
pecificity than any test alone. The combination
sophageal biopsy with esophageal pH study after HCl
eflux was most sensitive in patients with chronic
reflux symptoms ($p<0.05$), patients with esophagitis without reflux symptoms ($p<0.05$), and duodenal ulcer patients ($p<0.01$). The findings show the limitations of relying on the results of single esophageal tests in patients with symptoms or esophageal findings suggesting reflux esophagitis.

8633 BLOOD XYLOSE TEST IN CHILDHOOD: CORRELATION OF ONE-HOUR BLOOD XYLOSE VALUE TO THE NUMBER OF INTRAEPITHELIAL LYMPHOCYTES IN THE SMALL INTESTINAL MUCOSA IN CELIAC DISEASE. (Ger.) Schaad, U.; Gaze, H.; Hadorn, B.; Pedrinis, E.; Cottier, H.; Lorenz, E.; Colombo, J. P. (Universitats-Kinderklinik, Freiburgstrasse 23, CH-3010 Bern, Switzerland). *Helv. Paediatr. Acta* 30(4/5):331-341; 1975.

The diagnostic value of the 1-hr blood xylose test was examined in terms of the degree of mucosal embarrassment in celiac disease (CD). Venous samples were taken from 59 pediatric patients 1 hr after p.o. administration of D-xylose (5 g). The number of completely intraepithelial lymphocytes per 50 successive epithelial cell nuclei in small bowel biopsy sections was counted. The patient population included four groups: I, florid CD (16 cases); II, treated CD, with gluten-free diet (8 cases); III, clinically unconfirmed suspicion of CD (26 cases); and IV, status not confirmed after clinical diagnosis of CD (9 cases). The difference between the average values of group I and those of groups II, III, and IV was significant ($p<0.001$); groups II, III, and IV varied insignificantly. The correlation of a 1-hr blood xylose level of 20 mg% and the intraepithelial lymphocyte infiltration of 23 of 50 patients was highly significant for group I. No variable, including age and body weight, correlated with xylose level or lymphocyte number in groups II, III, and IV. The blood xylose test has an auxiliary role in establishing indications for intestinal biopsy and remains useful in atypical gastrointestinal clinical pictures or in family studies. It is not an effective diagnostic surrogate for small bowel biopsy in CD.

8634 INTRAVENOUS CHOLANGIOGRAPHY: RECURRING CONCEPTS. (Eng.) Scholz, F. J.; Larsen, C. R.; Wise, R. E. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *Semin. Roentgenol.* 11(3):197-202; 1976.

Techniques and concepts of i.v. cholangiography have been reexamined, and some current views are presented. Nonvisualization of the gallbladder on p.o. cholecystography and the evaluation of symptoms after cholecystectomy are the two most frequent and useful indications for performing i.v. cholangiography. The only absolute contraindication to i.v. cholangiography is a documented hypersensitivity reaction, such as profound or persisting hypotension, usually accompanied by nausea, vomiting, and dyspnea. This reaction occurs in about 1% of patients. Adrenalin (0.3 ml of a 1:1,000 solution, s.c.), diphenhydramine hydrochloride (50 mg, i.v. or i.m.), corticosteroids, and oxygen are administered, and the reaction usually responds promptly with no harm to the patient. Other types of reactions are visceral (nausea, vomiting, and occasional tenesmus) and dermal (pruritus, erythema, and hives). Visceral reactions are probably related to the rate of iodipamide administration and are not true allergic reactions. After a few minutes' delay, resumption of the injection at a slower rate usually permits completion of a satisfactory cholangiogram. The dermal reaction can be minimized or prevented by premedication with an antihistamine. A light breakfast before the administration of iodipamide may lessen the rate and severity of reactions. Good results may be obtained when 20 ml of a 52% solution of iodipamide is injected by hand at an even rate over a 10-min period. The patient is maintained in a 15-degree right posterior oblique position, and films are obtained at 20-min intervals. Toxic effects on the kidney and liver have been noted with iodipamide, and it should be used judiciously in the presence of coexisting renal and liver disease. Opacification of a gallbladder without calculi on i.v. cholangiography may indicate a normal gallbladder, even though the gallbladder failed to visualize on previous p.o. cholecystography. If the common bile duct is 15 mm or greater, obstruction or choledocholithiasis is possible. Narrowing of the distal common bile duct with a normal or dilated proximal duct is characteristic of pancreatic edema and fibrosis, and a long, tapered narrowing suggests pancreatitis. Opacification of the biliary tree depends on the functioning hepatocyte, and the predicted rate for successful visualization of the common duct with a bilirubin level of 1 mg/100 ml or less is about 92.5%; only 9.3% of patients with a level of 4 mg/100 ml or more show the common duct.

8635 ULTRASONIC CHOLANGIOGRAPHY. GRAY-SCALE B-SCAN EVALUATION OF THE COMMON BILE DUCT.

(Eng.) Goldberg, B. B. (Episcopal Hosp., Philadelphia, PA 19125). *Radiology* 118(2):401-404; 1976.

Twelve patients with jaundice were examined using gray-scale B-scanning to evaluate biliary duct dilatation, as well as possible choledocholithiasis. In an additional case, a definitive experiment was performed to establish the exact extent of the ability of ultrasound to localize the common bile duct and tributaries, as well as to detect choledocholithiasis. The patient, a 58-yr-old man who had undergone cholecystectomy 5 yr previously, presented with jaundice. No mass was detected using ultrasound or roentgenography. Gray-scale B-scan ultrasonograms revealed dilatation of the common bile duct and portions of the hepatic ducts; strong reflecting interfaces were seen arising from within the common duct, consistent with the diagnosis of choledocholithiasis. Transhepatic cholangiography confirmed the ultrasonic findings. When the ultrasonic examination was repeated, there was evidence of persistent dilatation of the common bile duct; there was no evidence of the strong echoes produced by the stones. A T-tube cholangiogram confirmed the duct dilatation and the absence of stones. Water-soluble contrast material containing microscopic air bubbles was injected through a T-tube into the common duct. Multiple internal echoes were recorded from within the previously echo-free bile-filled duct, due to the air bubbles. For further confirmation that the common bile duct was being detected ultrasonically, large air bubbles were injected and obliterated a significant portion of the distal wall of the duct. Strong echoes were produced along the anterior surface, which was expected, since air reflects almost all of the ultrasonic beam. Of the 12 patients studied, 7 had no evidence of a dilated bile duct, and the diagnosi was intrahepatic jaundice. All five cases of ultrasonically demonstrated dilated bile ducts were confirmed at surgery or autopsy. In one case, stone were identified ultrasonically in both the gallbladder and distal common bile duct. The results suggest that cholangiosonography should be the initial procedure of choice when differentiation between hepatocellular jaundice and posthepatic obstruction is important.

8636 SEGMENTAL ULTRASONIC TEST FOR THE STUDY OF CHOLECYSTODYSKINESIA.

(Eng.) Schennetten, F.; Pomaska, J. (35 Schluterstrasse, 1 Berli 12, Charlottenburg, E. Germany). *Ultrasonics* 13(6): 279-281; 1975.

The effect of ultrasonic stimulation, applied to four different points, on the gallbladder was studied in 10 women (aged 35-61 yr) with vague symptoms in the right upper quadrant. The patients received an i.v. injection of 20 ml of 40% biligrafin [the disodium salt of adipic acid (3-carboxy-24, 6 triodoaniline)]. X-rays of the gallbladder area were taken before and at intervals after the injection. This was followed by ultrasonic stimulation (applied using the impulse technique) for 10-20 min at frequencies of 3 megaHZ, and an effective intensity of 1.4-2.8 W/cm^2, with paraffin oil as a contact agent. The dorsal segments (a strip across the tip of the right scapula and a paravertebral str about a handsbreadth from the midline and extending upward from the 12th rib) were subjected to ultrasonic stimulation of a weaker intensity but longer duration than the ventral segment. The gallbladder shadow was analyzed planimetrically, and an approximate volumetric calculation was attempted. The gallbladder responded to segmental ultrasonic stimulation by both contraction and dilatation, presumably through a cutaneous visceral reflex arc; this response was qualitatively and quantitatively different from that obtained after an egg yolk meal Segmental ultrasonic stimulation of the gallbladder seems to be a suitable complement to fatty meal treatment. In addition, it offers the possibility of differentiating between the hyperkinetics and hypokinetic forms of gallbladder dyskinesia. Finally, it was observed that a more marked effect on the gallbladder can be produced by dorsal-segmental stimulation than by stimulation over the ventral points.

8637 CHOLECYSTOKINETIC CHOLECYSTOGRAPHY: EFFICACY AND TOLERANCE STUDY OF SINCALIDE.

(Eng.) Sargent, E. N.; Meyers, H. I.; Hubsher, J. (Univ. Southern California Medical Center, 1200

State St., Los Angeles, CA 90033). *Am. J. Roent-*
nol. 127(2):267-271; 1976.

cause contraction of the gallbladder in conjunc-
on with cholecystography may permit an additional
sessment of gallbladder function, the ability of
ncalide (the C-terminal octapeptide fragment of
olecystokinin) to cause gallbladder contraction
s studied in 40 patients undergoing cholecysto-
aphy. On the day prior to the examination, the
tients received a fatty meal for lunch and a fat-
ee evening meal. Sodium ipodate (3 g) was admin-
tered p.o. 12 hr prior to the examination. Within
15 min of an i.v. injection of sincalide (20 ng/
), maximum gallbladder contraction (i.e., a 40%
duction of the gallbladder area on at least 1
diograph) occurred in 24 patients. The remaining
patients required a second dose of 20 ng/kg
ncalide to achieve maximum gallbladder contrac-
on. The total dose administered to each patient
nged from 1.0 to 7.8 μg (average, 2.5 μg). The av-
age reduction in gallbladder size was 52% of the
einjection area (range, 5.5-100%). Six patients
owed complete gallbladder emptying. Cystic duct
sualization occurred in 31 patients, and common
le duct visualization occurred in 35. Transient
ld abdominal pain, cramps, or nausea occurred in
% of the patients. The administration of sincalide
oduces a peak gallbladder contraction earlier than
es a fatty meal. Cholecystokinetic cholecysto-
aphy may prove to be helpful in the diagnosis
acalculous cholecystitis if a relation can be
tablished between gallbladder contractility and
olecystitis. It may also be helpful in visualiz-
g small gallstones, which cannot be seen without
llbladder contraction.

38 CARCINOEMBRYONIC ANTIGEN-LIKE SUBSTANCES
OF HUMAN BILE. ISOLATION AND PARTIAL
ARACTERIZATION. (Eng.) Svenberg, T. (Danderyd
sp., Danderyd, Sweden). *Int. J. Cancer* 17(5):588-
6; 1976.

ree different types of biliary carcinoembryonic
tigen-like material were isolated and partially
aracterized to increase the cancer specificity of
e carcinoembryonic antigen (CEA) assay. Hepatic
le was obtained from the T-tube drains of anicteric
tients operated on for gallstones of the common
le duct. Gallbladder bile was obtained from pa-
ents with gallstones by puncture of the gallbladder
the beginning of cholecystectomy. In all, 5
mples of normal gallbladder bile, 35 samples of
patic bile, 10 samples of white bile (bile sub-
cted to inflammation), and 10 samples of bile
om gallbladders with stones but without obstruc-
on were examined. The presence of CEA and/or CEA-
ke material in bile was determined by rocket-line
munoelectrophoresis using antitumor extract and
ference CEA. These studies identified three
ecies of CEA-like macromolecules, called biliary
ycoprotein (BGP) I, II, and III, in human bile.
P I was in normal gallbladder bile and hepatic
le, but not in white bile, and was immunologically
lated to CEA and NGP (the normal CEA-like glyco-
otein). BGP I differed immunologically from CEA
in that it lacked the tumor-associated determinants of CEA. It was different from NGP and CEA in that it contained BGP I-specific determinants, as revealed by anti-BGP I antibodies. In bile from gallbladders with an obstructed outlet and subjected to cholecystitis, a nonmalignant inflammatory process, BGP I was replaced by BGP II and III. Immunologically and physicochemically, BGP II and III appeared closely similar to NGP and CEA, resp. Until the chemical structure of CEA and of noncancer-related CEA-like substances has been fully established, the theoretical implications of materials like BGP I, II, and III in the field of CEA research cannot be understood completely.

8639 AN IMMUNOPEROXIDASE TECHNIC FOR THE DEMONSTRATION OF THE HEPATITIS B SURFACE ANTIGEN IN HUMAN LIVERS. (Eng.) Afroudakis, A. P.; Liew, C.-T.; Peters, R. L. (John Wesley Hosp., 2825 South Hope St., Los Angeles, CA 90007). *Am. J. Clin. Pathol.* 65(4):533-539; 1976.

A sensitive method for demonstrating the site of hepatitis B surface antigen (HBsAg) in fixed human liver tissue embedded in either paraffin or araldite is described. The method uses the peroxidase-rabbit antiperoxidase linkage through goat anti-rabbit to rabbit anti-HBsAg. Six counterelectrophoresis slides utilizing agarose were made using two different HBsAg titers electrophoresed against antisera from human sources. HBsAg-HBs antibody (HBsAb) complexes on unfixed agar slides were stained positively by orcein but not by peroxidase. Positive stain was obtained with the immunoperoxidase technique only on fixed (with B-5, formalin, or Bovin's fixative) and unfixed agar slides where the bound HBsAb had been removed previously from the precipitating arcs by exposure to the proteolytic activity of a 0.1% solution pronase. None of the fixatives affected the intensity of the reaction. Specimens of human liver tissue were fixed in either B-5 or formalin and embedded in araldite. A brown cytoplasmic stain of variable intensity developed that was proportional to the amount of antigenic material in the liver cells. The stained cytoplasm corresponded in shape and distribution to the eosinophilic, finely granular, ground glass-appearing cytoplasm. This method allows confirmation of positive reaction by appropriate blocking controls and is more sensitive than the orcein stain of Shikata, but slightly more time-consuming.

8640 RADIOSELENIUM IN DUODENAL ASPIRATE AFTER SECRETIN AND PANCREOZYMIN STIMULATION. A RELIABLE TEST OF EXOCRINE PANCREATIC FUNCTION. (Eng.) Scuro, L. A.; Dobrilla, G.; Vantini, I.; Franchi, R.; Marabini, A.; Angelini, G.; Cavallini, G.; Vaona, B.; Castegnaro, A. (Istituto di Clinica Medica III, dell'Universita di Padova, Policlinico Borgo Roma, 37100 Verona, Italy). *Rend. Gastroenterol.* 7(3):177-184; 1975.

A method for testing pancreatic exocrine function based on the determination of radioactivity in the duodenal contents after stimulation with secretin and pancreozymin was evaluated in 10 patients with chronic relapsing pancreatitis and 10 normal subjects following the i.v. injection of ^{75}Se-selenomethionine (4 μCi/kg). GIH secretin (1 clinical U/kg) and cholecystokinin (1 Ivy U/kg) were administered i.v. 30 min after selenomethionine, and duodenal contents were collected in six consecutive 30-min samples. The mean volume of the duodenal aspirate from the patients was significantly lower than that from controls in all but the last time period. Bicarbonate content and pancreatic enzyme content were similarly decreased in the aspirate from the patients. The radioactivity of the aspirates was similar to that of the controls prior to stimulation, but after hormonal stimulation, the mean radioactivity of control aspirates was significantly higher than that of patient aspirates. While there was some overlap in the third and fourth collection periods, when the pooled samples of all collection periods were compared, no overlap was found. The correlation coefficients between each enzymatic activity and the percent of radioactivity in the duodenal aspirates ranged from 0.6 to 0.9 in the patients, the highest value being 0.9 for chymotrypsin. The mean correlation coefficient in the control aspirates was 0.25. Gastric radioactivity measured in the same subjects was initially not appreciable and became a little more than 50% of the duodenal aspirate activity only in the 60- to 120-min period. The percentage of radioactivity in precipitated gastric protein never exceeded 20%. Less than 1% of radioactivity was found in the bile in two patients with T-tubes in the common duct. The specificity and accuracy of the test are emphasized.

8641 UPPER-GASTROINTESTINAL ENDOSCOPY IN PERSPECTIVE. (Eng.) Salter, R. H. (Cumberland Infirmary, Carlisle, CA2 7HY, England). *Lancet* 2(7940):863-865; 1975.

8642 ENDOSCOPIC MEASUREMENT OF TRANSMUCOSAL POTENTIAL DIFFERENCES FOR EVALUATION OF GASTRODUODENAL LESIONS. (Eng.) Merino, G. E.; Goodale, R. L. (Univ. Minnesota Medical Sch., Minneapolis, MN). *Surg. Forum* 26:368-370; 1975.

8643 HYPOTONIC EXAMINATION OF ESOPHAGUS IN PEDIATRIC RADIOLOGY. (Ger.) Zwad, H.-D.; Uthgenannt, H. (Abteilung fur Padiatrie, Medizinischen Hochschule Lubeck, 24 Lubeck, Kronsforder Allee 71-73, W. Germany). *Roentgenblaetter* 28(10): 455-462; 1975.

8644 MECKEL'S BLEEDING DIVERTICULUM DIAGNOSED BY MESENTERIC ARTERIOGRAPHY. (Eng.) Hall, T. J. (St. James' Hosp., Leeds, England). *Br. J. Surg.* 62(11):882-884; 1975.

8645 IDENTIFICATION OF A NEW ONCOFOETAL ANTIGEN ASSOCIATED WITH SEVERAL TYPES OF HUMAN CARCINOMAS. (Eng.) Fritsche, R.; Mach, J.-P. (Inst. Biochemistry, Univ. Lausanne, 21 rue du Bugnon, 1011 Lausanne, Switzerland). *Nature* 258 (5537):734-737; 1975.

8646 ENDOSCOPY IN PATIENTS WITH MALIGNANT CONDITIONS OF THE GASTROINTESTINAL TRACT (Eng.) Yamada, K.; Holyoke, E. D.; Elias, E. G. (Dept. General Surgery, Roswell Park Memorial Inst State Univ. New York, Buffalo, NY). *Surg. Gynecol Obstet.* 141(6):903-906; 1975.

8647 RADIOGRAPHIC DIFFERENTIAL DIAGNOSIS OF TUMORS OF JEJUNUM AND ILEUM. (Ger.) Franken, Th.; Schirmer, G.; Sobbe, A. (Radiologisc Klinik, 53 Bonn, Venusberg, W. Germany). *Roentgen blaetter* 28(9):389-399; 1975.

8648 STUDIES ON DIAGNOSIS OF GASTRIC EARLY CANCER (9): GASTRIC ACID SECRETION AND GASTRIC OUTPUT IN RELATION TO GASTRIC ULCERATIVE EARLY CANCER AND BENIGN ULCER [Abstract]. (Eng.) Sakita, T.; Oguro, Y.; Fukutomi, H.; Nakamura, K.; Miwa, T.; Kasumi, A.; Yoshimori, M.; Tani, N.; Hirashima, T.; Ko, S.; Arai, S.; Fuchino, K.; Suzuki, S.; Takatani, O.; Abe, K. (Natl. Cancer Center Hosp., Tokyo, Japan). *Jpn. J. Med.* 14(2): 116-117; 1975.

8649 DIAGNOSTIC VALUE OF BIOPSIES IN VILLOUS PAPILLOMA OF THE COLON AND RECTUM. (Eng Takolander, R. J.; Nordling, S. (Univ. Central Hosp., Helsinki, Finland). *Ann. Chir. Gynaecol. Fenn.* 61(6):327-331; 1975.

8650 ROENTGENOLOGICAL FEATURES IN VILLOUS PAPILLOMA OF THE COLON AND RECTUM. (Eng Takolander, R. J.; Standertskjold-Nordenstam, C.-G (Meilahti Hosp., Univ. Central Hosp., Helsinki, Finland). *Ann. Chir. Gynaecol. Fenn.* 61(6):332-339; 1975.

8651 STUDIES ON THE DIAGNOSIS OF DISEASES OF SMALL INTESTINE: DISACCHARIDASE ACTIVIT IN RELATION TO BIOPSY HISTOLOGY [Abstract]. (Eng. Matsunaga, F.; Yoshida, Y.; Ishiwata, J.; Sasaki, Goto, S.; Hosaka, T.; Yanagiya, S.; Nakasato, N.; Takashina, K.; Itoh, A. (Hirosaki Univ. Sch. Medicine, Hirosaki, Japan). *Jpn. J. Med.* 14(2):120-121; 1975.

8652 GLYCINE/TAURINE RATIO IN SERUM AND DUODE NAL ASPIRATES IN NORMAL PERSONS AND PATIENTS WITH TERMINAL ILEOPATHY [Abstract]. (Eng Stengaard-Pedersen, K.; Peterslund, N. (Arhus Kommunehospital, Arhus, Denmark). *Scand. J. Gastr enterol.* 10(34):29; 1975.

8653 GENERALIZED FATAL $BaSO_4$ EMBOLISM FROM VAGINAL APPLICATION OF COLONOGRAPHIC ENEMA. A CASE REPORT. (Eng.) Partanen-Talsta, A Hyyppa, S.; Hirvonen, J. (Dept. Forensic Medicine, niv. Oulu, Oulu, Finland). *Forensic Sci.* 6:9-15; 975.

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555 CENTERING AROUND ^{131}I-PVP EXCRETION TEST [Abstract]. (Eng.) Takeo, N.; Kanao, K. Kansai Medical Univ., Moriguchi, Japan). *Gastronterol. Jpn.* 10(3):235; 1975.

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657 JEJUNAL BIOPSY IN THE MANAGEMENT OF INFANTS SUSPECTED OF COW'S MILK PROTEIN NTOLERANCE [Abstract]. (Eng.) Shiner, M.; allard, J.; Brook, C. G. D.; Herman, S.; Lovell, . (Central Middlesex Hosp., London, England). *Gut* 6(10):822; 1975.

658 ABSENCE AND RETENTION OF SMALL BOWEL GAS IN INFANTS WITH MIDGUT VOLVULUS: MECHAISMS AND SIGNIFICANCE. (Eng.) Kassner, E. G.; ottmeier, P. K. (State Univ. New York, Downstate edical Center, 450 Clarkson Ave. [Box 45], Brookyn, NY 11203). *Pediatr. Radiol.* 4(1):28-30; 1975.

659 DIAGNOSIS OF LIVER DISEASES BY LABORATORY RESULTS AND DISCRIMINANT ANALYSIS: IDENIFICATION OF BEST COMBINATIONS OF LABORATORY TESTS. Eng.) Solberg, H. E.; Skrede, S.; Blomhoff, J. P. Inst. Clinical Biochemistry, Natl. Hosp. Norway, sly 1, Norway). *Scand. J. Gastroenterol.* 10(8): 13-721; 1975.

660 IMPACT OF THE COMPUTER ON THE DIAGNOSIS OF LIVER DISEASES: COMPARISON WITH LINICIAN'S PERFORMANCE [Abstract]. (Eng.) humeaux, D.; Begon, F.; Lockhar, A.-M.; Metreau, .-M. (INSERM U-99, Hopital Henri Mondor, Creteil, rance). *Digestion* 12(4/6):271; 1975.

661 LIVER SCANNING AND THE INTRAHEPATIC GALLBLADDER: CASE REPORT. (Eng.) Schulz, . C.; Shields, J. B.; Fletcher, J. W.; Donati, . M. (St. Louis Veterans Admin. Hosp., St. Louis, O 63125). *J. Nucl. Med.* 16(11):1029-1030; 1975.

662 DIAGNOSTIC SIGNIFICANCE OF SERIAL α-FETOPROTEIN (AFP) DETERMINATION BY RADIOMMUNOASSAY (RIA) IN CIRRHOSIS [Abstract]. (Eng.) adziyannis, S.; Karvountzis, G.; Manesis, E.; Gioustozi, A.; Merikas, G. (Univ. Athens Medical Sch., Athens, Greece). *Digestion* 12(4/6):267-268; 1975.

8663 THE PRESENT STATUS OF CEA IN DIAGNOSIS, PROGNOSIS, AND EVALUATION OF THERAPY. (Eng.) Zamcheck, N. (Mallory Gastrointestinal Res. Lab., Boston City Hosp., Boston, MA 02118). *Cancer* 36(Suppl. 6):2460-2468; 1975.

8664 TRANSAMINASITIS [Abstract]. (Eng.) Petera, V.; Machanova, D.; Karlicek, V.; Topolcan, O. (Dept. Medicine, Charles Univ., Plzen, Czechoslovakia). *Digestion* 12(4/6):338; 1975.

8665 DIFFERENTIAL DIAGNOSIS BETWEEN BENIGN AND MALIGNANT BILIARY TRACT OBSTRUCTION: DISCRIMINATIVE USEFULNESS OF SOME CLINICAL AND LABORATORY DATA. (Eng.) Giusti, G.; Piccinino, F.; Sagnelli, E.; Pasquale, G. (Clinic Infectious Diseases, Univ. Naples, Via Damenico Cotugno, I-80135 Naples, Italy). *Acta Hepatogastroenterol. (Stuttg.)* 22(6):374-379; 1975.

8666 ENDOSCOPY AND RETROGRADE CHOLANGIOGRAPHY VIA GASTROSTOMY. (Eng.) Schapira, L.; Falkenstein, D. B.; Zimmon, D. S. (Manhattan Veterans Admin. Hosp., 408 First Ave., New York, NY 10010). *Gastrointest. Endosc.* 22(2):103; 1975.

8667 A NEW CONTRAST MEDIUM FOR CHOLANGIO-CHOLECYSTOGRAPHY: MEGLUMINE IODOXAMATE. (Eng.) Sargent, E. N.; Schulman, A.; Meyers, H. I.; Gutler, R. B.; Nicoloff, J. T.; DiFazio, L. T. (Univ. Southern California Medical Center, 1200 N. State St., Los Angeles, CA 90033). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1):251-258; 1975.

8668 BILIARY-BRONCHIAL FISTULA DEMONSTRATED BY ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY. (Eng.) Watkins, L.; Laufer, I.; Evans, G.; Mullens, J. E. (McMaster Univ. Medical Center, Hamilton, Ontario, Canada L8S 4J9). *Can. Med. Assoc. J.* 113(9):868, 871, 874; 1975.

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8670 GEL PRECIPITIN TESTS FOR HEPATITIS-B SURFACE ANTIGEN: FALSE POSITIVE REACTIONS DUE TO THE PRESENCE OF STAPHYLOCOCCAL ANTIGEN IN CONTAMINATED PLASMA SAMPLES. (Eng.) Combridge, B. S.; Shaw, C. (Blood Products Lab., Lister Inst. Preventive Medicine, Elstree, Herts., England). *Vox Sang.* 29(6):456-458; 1975.

8671 HEPATIC SCINTIGRAPHIC DEFECT IN VIRAL HEPATITIS. (Eng.) Bergmann, P.; Struyven, J.; Somers, G. (Brugmann Hosp., Van Gehuchtenplaats 4, B-1020 Brussels, Belgium). *J. Nucl. Biol. Med.* 19(3):162-163; 1975.

8672 FOCAL PORTA HEPATIS SCINTISCAN DEFECTS: WHAT IS THEIR SIGNIFICANCE? (Eng.) McClelland, R. R. (St. Paul-Ramsey Hosp., Univ. at Jackson, St. Paul, MN 55110). *J. Nucl. Med.* 16(11): 1007-1012; 1975.

8673 IDENTIFICATION OF AN INFECTED PSEUDOCYST OF THE PANCREAS WITH ^{67}Ga-CITRATE: CASE REPORT. (Eng.) Kennedy, T. D.; Martin, N. L.; Robinson, R. G.; Preston, D. F. (Kansas Univ. Medical Center, Kansas City, KS). *J. Nucl. Med.* 16(12): 1132-1134; 1975.

8674 INSULINOMA: AIDS TO MANAGEMENT. (Eng.) Smith, M. (Verco Building, 178 North Terrace, Adelaide, S. Australia 5000). *Aust. N.Z. J. Surg.* 45(4):354-361; 1975.

8675 INTERLABORATORY REPRODUCIBILITY OF GASTRIN MEASUREMENTS BY RADIOIMMUNOASSAY. (Eng.) Rayford, P. L.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *J. Lab. Clin. Med.* 86(3):521-527; 1975.

8676 NEONATAL HYPERGASTRINAEMIA IN MAN [Abstract]. (Eng.) Torsoli, A.; Delle Fave, G. F.; Melchiorri, P.; Sopranzi, N.; Kohn, A. (Gastroenterology Unit, 2nd Dept. Medicine, Univ., Rome, Italy). *Gut* 16(10):834; 1975.

8677 THE STALACTITE PHENOMENON IN DOUBLE CONTRAST STUDIES OF THE STOMACH. (Eng.) Op den Orth, J. O.; Ploem, S. (Dept. Radiology, St. Elisabeth's of Groote Gasthuis Haarlem, Holland) *Radiology* 117(3):523-526; 1975.

8678 SIGNIFICANCE OF GASTRIC ANALYSIS WITH PARTICULAR REFERENCE TO THE DIAGNOSIS OF ZOLLINGER-ELLISON SYNDROME. (Eng.) Ishimori, A.; Miura, Y.; Sakurada, H.; Yamagata, S.; Tsuda, K.; Kawamura, T.; Arakawa, H.; Yamagata, S. (Tohoku Univ. Sch. Medicine, 1-1 Seiryomachi, 980, Sendai, Japan). *Tohoku J. Exp. Med.* 117(1):15-21; 1975.

See also, 8689, 8693, 8711, 8732, 8747, 8757, 8762, 8780, 8792, 8793, 8794, 8795, 8806, 8847, 8848, 8853, 8859, 8862, 8880, 8903, 8904, 8942, 8943, 8957, 9047, 9054, 9055, 9056, 9065, 9073, 9074, 9077, 9168, 9187.

GASTROINTESTINAL DISEASES

ESOPHAGUS

9 FUNCTIONAL EVALUATION OF THE INTERPOSED COLON AS AN ESOPHAGEAL SUBSTITUTE. (Eng.) rk, J.; Moraldi, A.; Moossa, A. R.; Hall, A. W.; eester, T. R.; Skinner, D. B. (Pritzker Sch. icine, Univ. Chicago, 950 East 59th Street, Chio, IL 60637). *Ann. Surg.* 183(2):93-100; 1976.

examine the motility pattern of esophageal repement and the mechanisms of prevention of reflux regurgitation, manometric, fluoroscopic, and lux tests were carried out in five Rhesus monkeys four human adults with colonic reconstruction the esophagus. Esophageal resections had been formed for advanced achalasia and stricture in patients, peptic stricture in one, and esophageal coma in the fourth. Gravity was the principal ce responsible for transit of material through graft. Spontaneous propulsive activity was ficult to quantify. Haustral, multihaustral, and uential haustral contractions occurred, and the ements were completed more slowly than esophageal istalsis. Intermittent straining and coughing both monkeys and humans caused contrast material flow out of the colon segment in both directions. the monkeys, 71% of stimuli (0.1 normal concentran HCl, hot coffee, whiskey, carbonated beverage, bisacodyl) produced a response in the colon segt. Among the human patients, stimulation with normal concentration HCl, carbonated drink, or ffee produced a sequential multihaustral contracn in 8 and segmental or synchronous contraction 16 of 41 tests. Reflux could be controlled kly and variably at the diaphragmatic hiatus and esophagocolic anastomosis and was readily overe by increased intraluminal pressure and distenn. Washing back and forth was observed with piration in the monkeys when barium distended the logastric cavity. Esophageal peristalsis was uired to return refluxed material. The final rier to regurgitation is the cricopharyngeal scle.

30 COMPLICATIONS ASSOCIATED WITH ESOPHAGOGASTRODUODENOSCOPY AND WITH ESOPHAGEAL ATION. (Eng.) Mandelstam, P.; Sugawa, C.; Sil-, S. E.; Nebel, O. T.; Rogers, B. H. G. (Dept. licine, Univ. Kentucky, Lexington, KY 40506). *strointest. Endosc.* 23(1):16-19; 1976.

complications arising from esophagogastroduooscopy and of esophageal dilatation were analyzed a series of 211,410 p.o. endoscopic examinations. overall rate of complications due to esophagostroduodenoscopy was 507/211,410 (1.32/1,000 aminations). The major complications included rforation (70 cases, 5 fatalities), bleeding (63 ses, 2 fatalities), cardiopulmonary (129 cases, fatalities), and infection (17 cases, 0 fatalities). sites of perforation included the pharynx and per esophagus (14 cases), mid and distal esophagus 2 cases), stomach (10 cases), duodenum (2 cases), d afferent loop (1 case). The sites of bleeding cluded the esophagus (8 cases), stomach (19 cases), duodenum (2 cases), and afferent loop (1 case). Initial or recurrent esophageal variceal bleeding was apparently provoked by endoscopy in four patients. Most of the cases of postendoscopy bleeding from the stomach followed biopsy. The cardiopulmonary complications included aspiration (25 cases), respiratory arrest secondary to i.v. diazepam (23 cases) or topical pharyngeal anesthesia (3 cases), myocardial infarction (6 cases), and cardiac arrest or ventricular fibrillation (8 cases). The overall complication rate for esophageal dilatation using mercury bougies was 4.25/1,000; that for dilatation using metal olives was 6.1/1,000; and that for pneumatic or mechanical dilatation was 18.4/1,000. These complications included perforation (12/13,139 dilatations in which mercury bougies were used; 33/9,431 with metal olives; and 14/1,224 with pneumatic or mechanical dilatation), bleeding (45, 8, and 4 dilatations with the respective techniques), cardiopulmonary complications (1, 5, and 1, resp.), and infections (0, 2, and 0, resp.). The results confirm the prevailing safety of p.o. endoscopy and dilatation, but indicate thay any suspicion of perforation requires prompt radiologic investigation and that cardiopulmonary resuscitation should be immediately available in the endoscopy room.

8681 ALKALINE REFLUX ESOPHAGITIS AFTER TOTAL GASTRECTOMY. (Eng.) Morrow, D.; Passaro, E. R., Jr. (U.C.L.A. Sch. Medicine, Los Angeles, CA). *Am. J. Surg.* 132(2):287-291; 1976.

The cases of five patients with severe alkaline reflux esophagitis after end-to-side esophagojejunostomy with distal enteroenterostomy (loop EJEE) in whom significant symptomatic improvement occurred after revision to a Roux-en-Y esophagojejunostomy with a jejunal pouch (Roux-en-Y EJ) are presented. The clinical course of seven other patients who underwent one of these procedures following total gastrectomy is reviewed. All patients underwent total gastrectomy for the treatment of the Zollinger-Ellison syndrome. All five patients with initial loop EJEE had incapacitating alkaline reflux esophagitis, which was manifested in one patient primarily by a bitter brash, in another by bitter brash and recurrent vomiting, in two by retrosternal burning pain, and in the remaining patient by severe retrosternal pain, vomiting, and bitter brash. After conversion, symptoms of reflux esophagitis abated. Four patients had mild to severe dumping prior to the conversion. Four patients lost 25, 45, 70, and 75 pounds, resp., after the initial operation; after the reconstruction, these patients regained 10-35 pounds. In the second group of seven patients, five had Roux-en-Y EJ and two had loop EJEE reconstruction. Two of the five patients with Roux-en-Y reconstruction had mild to moderate retrosternal pain, and three had no pain; all denied vomiting, regurgitation or bitter brash, diarrhea, or dumping. One of the two patients with loop EJEE had severe alkaline reflux esophagitis, moderate dumping, and weight loss, while the other was asymptomatic.

These results suggest that Roux-en-Y EJ is an excellent reconstructive procedure following total gastrectomy for Zollinger-Ellison syndrome, and that loop EJEE may not be the optimal procedure because of esophagitis and dumping.

8682 ALTERATION IN ESOPHAGEAL MOTILITY AFTER LARYNGECTOMY. (Eng.) Duranceau, A.; Jamieson, G.; Hurwitz, A. L.; Jones, R. S.; Postlethwait, R. W. (Dept. Surgery, Hotel Dieu De Montreal, 3840 Rue St. Urbain, Montreal, Quebec H2W 1T8 Canada). *Am. J. Surg.* 131(1):30-35; 1976.

Manometric studies were conducted among 10 patients who had undergone laryngectomy for carcinoma of the larynx to determine the status of esophageal motility. Six patients without esophageal disease served as controls. The resting pressure of the upper esophageal sphincter (UES) in the control group was 34.3 mm Hg, and the peak postdeglutition pressure was 46.4 mm Hg. Corresponding values for the laryngectomized patients were 12.9 and 24.5 mm Hg, resp. The UES coordination with the pharynx was normal in 98.9%, and relaxation was complete in 97% of swallows in the control group, compared to 73.9% and 65.3%, resp., in the test group. In the proximal esophagus in controls, the wave pressure had a mean peak of 24.1 mm Hg, and peristalsis was normal in 99% of waves. The patients with laryngectomy had a mean peak pressure of 13.7 mm Hg, and only 76% of the waves showed a normal peristaltic pattern. In the distal esophagus, controls had a mean peak pressure of 58.7 mm Hg, compared to 20.4 mm Hg in the test group. All waves in the control group were normal, but only 85% of waves of laryngectomized patients were normal. No significant differences between controls and laryngectomees were noted in the resting and postdeglutition lower esophageal sphincter (LES) pressures or in the degree of LES coordination and relaxation. It is suggested that disturbances in esophageal motility may be relatively frequent after laryngectomy.

8683 INFLUENCING THE LOWER ESOPHAGEAL SPHINCTER BY PHENYLALANINE-LYSINE-VASOPRESSIN. POSSIBLE EFFECTS ON BLEEDING ESOPHAGEAL VARICES. (Ger.) Wienbeck, M.; Bovelet, M.; Hausamen, T.-U.; Strohmeyer, G. (Medizinische Einrichtungen der Universitat, II. Medizinische Klinik u. Poliklinik, Moorenstr. 5, D-4000 Dusseldorf 1, W. Germany). *Z. Gastroenterol.* 14(3):333-341; 1976.

The effect of pressor agents on lower esophageal sphincter (LES) pressure and gastroesophageal reflux and its clarification by serum gastrin level were examined in 24 adult volunteers without esophageal pathology. LES pressure was determined by the continuous withdrawal method. 2,3-Phenylalanine-8-lysine-vasopressin (PLV) was infused at the following doses: 0.54, 1.08, 2.7, 10, 27, and 54 mU/kg/hr each, for 28 min. LES pressure tended to increase if the initial PLV doses were below 2.7 mU/kg and then to reverse direction, falling below initial levels, if the PLV doses were increased above 2.7 mU. Only the 0.54-mU dose was significant ($p<0.05$). High PLV doses elicited a direct and significant fall ($p<0.05$) in LES pressure, which then remained level during the test period. At 2.7 mU, PLV elevated the resting LES pressure from 12.3 to 17.9 mm Hg. PLV had no effect on serum gastrin levels; resting LES pressure and serum gastrin coulc not be correlated. The probands became increasingl more pallid as the infusion continued at 2.7 mU PLV. Convulsive abdominal pain was reported at 10 mU. Peripheral blood pressure in most probands remained unchanged; in no case was there a hypertensive episode or cardiac symptoms. A continuous, long-term infusion of lower doses of pressor substances is recommended for the treatment of esophageal reflux.

8684 ESOPHAGEAL FUNCTION AFTER FUNDOPLICATION (NISSEN'S METHOD). (Ger.) Krejs, G. J.; Buhler, H.; Akovbiantz, A.; Keller, H.; Landolt, M.; Blum, A. L. (Medizinische Klinik, Stadtspital Triemli, CH-8063 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 106(24):825-828; 1976.

8685 BOUGINAGE OF THE UPPER AND LOWER SEGMENT OF THE ESOPHAGUS IN ESOPHAGEAL ATRESIA TYP 2 (VOGT). (Ger.) Hass, W. (Chirurgische Abteilung der Kinderklinik des Stadt., Rudolf-Virchow-Krankenhaus, Reinickendorfer Strasse 61, 1 Berlin 65, E. Germany). *Z. Kinderchir.* 17(2):170-173; 1975.

8686 EDER-PUESTOW'S METHOD OF BOUGIE THERAPY WITH A FLEXIBLE ESOPHAGOSCOPE FOR ESOPHAGEAL STRICTURES. (Dan.) Borgeskov, S.; Struve-Christensen, E. (Dept. Thoracic Surgery, Rigshospitalet, DK-2100 Copenhagen, Denmark). *Ugeskr. Laeger* 137(46):2692-2694; 1975.

8687 GRANULAR CELL TUMORS ("MYOBLASTOMAS") OF THE ESOPHAGUS. (Eng.) Gloor, F.; Clemencon, G. (Dept. Pathology, Kantonsspital, CH-9006 St. Gallen, Switzerland). *Endoscopy* 7(4):239-242; 1975.

8688 PATHOGENESIS OF ESOPHAGEAL DIVERTICULUM. (Spa.) Benages, A.; Ridocci, M. T.; Molina, R.; Mora, F.; Cosin, J. A.; Castellanos, G.; Soria, T.; Parrilla, P. (Hospital Clinico Universitario, Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(2):201-212; 1976.

8689 PERFORATION OF THE ESOPHAGUS IN CHILDHOOD. DIAGNOSIS AND THERAPY. (Ger.) Geley, L. (Landeskinderkrankenhaus Linz, Chirurgische Abteilung, Krankenhausstrasse 26, A-4010 Linz, Austria). *Z. Kinderchir.* 17(2):138-148; 1975.

8690 ESOPHAGEAL MOTILITY IN PATIENTS WITH DIFFUSE SPASM OF THE ESOPHAGUS. (Spa.) Csendes, A.; Guzman, S. (Departamento de Cirugia,

ospital J. J. Aguirre, Sede Santiago Norte, Chile).
ev. Med. *Chil.* 103(4):240-243; 1975.

691 HEMORRHAGE INTO THE DIGESTIVE TRACT DUE TO DESCENDING ESOPHAGEAL VARICES. (Spa.)
uro, J.; Cosme, A.; Perez-Jimenez, F.; Ortiz-Vasquez,
.; Larrauri, J. (Clinica "La Paz" de la Seguridad
ocial, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.*
7(2):227-240; 1976.

See also, 8465, 8632, 8643, 8646, 8734, 8780, 9026.

STOMACH

692 GASTROINTESTINAL BLEEDING DUE TO ASPIRIN. ADVANTAGES OF LYSINE ACETYLSALICYLATE.
Fre.) Aron, E.; Delbarre, B.; Besnard, J.-C.
Clinique Medicale A, Faculte de Medecine, 37032
ours Cedex, France). *Therapie* 31(2):247-256; 1976.

he results of a comparative study of aspirin-induced
astrointestinal hemorrhage in humans and rats are
resented. Aspirin (ASP) and lysine acetylsalicy-
ate (LAS), at 350-mg/kg doses, p.o., induced an
verage 48-hr blood loss in rats of 1,054 µl ($p<0.01$)
nd 250 ($p>0.05$) µl, resp., compared to 136 µl in
um arabic controls. Fecal loss of ^{51}Cr-labeled
BC was 142 and 192 µl, resp., after LAS i.v. injec-
ions equivalent to 100 and 200 mg/kg ASP; since
ontrol values averaged 239 µl, both LAS losses are
ot significant ($p>0.05$). An increase in fecal RBC
oss from 87 to 98 µl ($p>0.05$) was established by
AS, i.m., at doses equivalent to 100 mg/kg ASP.
n man, 4 g ASP, p.o., did not significantly alter
lood loss; there was also no difference before,
uring, or after administration of 2 g ASP, i.v. or
.m. In solubility studies, 200, 300, and 400 mg/
g ASP induced a salicylemia of 22, 40, and 52 µg/
l, but the same doses of LAS elicited increases of
1, 112, and 148 µg/ml. Similar results were
btained in 28 subjects, with gastrointestinal
isease. In another study in 20 subjects, the LAS
bsorption rate was three times that of ASP at 10
in postingestion. In general, microscopic hemor-
hage after LAS is 10% compared to 70% after ASP.

693 ROENTGEN FEATURES OF THE SUPERFICIAL DEPRESSED TYPE OF EARLY GASTRIC CARCINOMA.
Eng.) Koga, M.; Nakata, H.; Kiyonari, H.; Inakura,
.; Tanaka, M. (Dept. Radiology, Natl. Cancer Center
osp., Kyushu, Japan). *Radiology* 115(2):289-292;
975.

he essential roentgen findings and radiographic
echnique used in the diagnosis of early gastric
arcinoma are described. Coliopan (one ampule,
.m.) is given 5 min before examination to make the
tomach hypertonic, suppress gastric secretion, and
elay the passage of barium into the small bowel.
double-contrast study is then performed for
etailed examination of any superficial depressed
gastric carcinoma. Barium is given in 100-ml increments, for a total of about 300 ml. Air (200-300 ml) is then introduced via a small nasogastric tube. The patient is generally supine, although for studies of the posterior wall of the upper portion of the body and fundus, the Schatzki position is recommended. For lesions of anterior stomach wall, the barium dosage is usually 30-50 ml and the patient is prone; as much as 500 ml of air may be introduced. With respect to roentgen findings, at the stage when diagnosis is possible, the gross appearance of gastric carcinoma is that of an excavation, often associated with a deeper central ulceration. The most important feature of the excavation is its irregular outline, consisting of zigzag lines conforming to the areae gastricae. The excavation is shallow and its base may be granular or uneven. The area surrounding the excavation usually contains converging mucosal folds that are abruptly narrowed or terminated at the tips and often show clubbing. An asymmetric elevated area partially surrounding the excavation may be an indication of carcinoma.

8694 MENETRIER'S DISEASE: SERIAL MORPHOLOGICAL SECRETORY, AND SEROLOGICAL OBSERVATIONS.
(Eng.) Berenson, M. M.; Sannella, J.; Freston, J. W. (Univ. Utah Medical Center, 50 North Medical Drive, Salt Lake City, UT 84132). *Gastroenterology* 70(2):257-263; 1976.

A case of Menetrier's disease in a 51-yr-old man is presented. His initial complaints were malaise, nausea, and vomiting. An upper gastrointestinal series revealed hypertrophic gastric folds; the patient had hypoproteinemia, low gastric acid secretion, and several gallstones. He did not respond to cholecystectomy and subsequently developed pedal edema. The diagnosis was made from a full thickness gastric biopsy taken at laparotomy. Depressed serum immunoglobulins, elevated plasma gastrin levels, and an elevated bowel protein loss were also observed. Antibodies to parietal cells and to various dietary substances were detected. Over the next 12-18 months, the gross abnormalities in the stomach gradually normalized, as determined by gastrointestinal radiography, endoscopic appearance, and gastric peroral biopsies. The histological picture during this period changed from hypertrophy of the gastric mucosa to atrophic gastritis. Functionally, there was also a normalization of gastric acid secretion, serum gastrin levels, serum protein content, and gastrointestinal loss of protein after atropine administration. The serum antibodies to parietal cells and foodstuffs disappeared.

8695 PROSPECTIVE STUDIES OF GASTRIC SECRETION IN TRAUMA PATIENTS. (Eng.)

Stremple, J. F. (Veterans Admin. Hosp., University Drive C, Pittsburgh, PA 15240). *Am. J. Surg.* 131(1):78-85; 1976.

Gastric secretion studies in 36 trauma patients are reported. There were 16 cases of intra-abdominal injury, 15 of cranial trauma, 4 with chest injuries, 3 with extensive burns, 2 multiple extremity injury, and 2 with spinal cord injuries. Sixteen patients were categorized as having more severe injuries. Gastric acid secretion in more severely injured patients increased sharply between 24 and 36 hr after trauma and continued to rise until 72 hr. Patients with less severe injuries had a smaller increase in gastric acid secretion, to a peak at 36 hr, followed by marked diminution to near zero at 72 hr. Patients with abdominal injuries had a marked increase in gastric acid secretion between 24 and 36 hr, while patients with cranial injuries did not have increased gastric acid secretion. Severely injured patients had a marked increase in pepsin output between 24 and 36 hr, while pepsin output decreased throughout the 72 hr period in less severely injured patients. Patients with abdominal injuries had a marked increase in pepsin output between 24 and 36 hr, while patients with cranial injuries had an almost continuous decrease in pepsin output. Serum gastrin levels were never elevated, and there was no correlation between them and the severity or site of injury. Gastric mucosal cell renewal, as estimated by gastric juice DNA, was increased in patients with severe injury, and except for a valley at 48 hr, this increase was steady throughout the 72-hr period. Less severely injured patients had markedly increased gastric juice DNA at 36 hr, a slight reduction at 48 and 60 hr, and another increase at 72 hr. Patients with abdominal injuries had decreased gastric juice DNA after 24 hr, while in those with cranial injuries, this parameter reached a peak at 36 hr. Urinary nitrogen excretion increased in several and less severely injured patients to a maximum at 36 hr after trauma, followed by a decline. Patients with cranial injury had initially normal urinary nitrogen levels, which reached a peak at 24 hr, and then declined. Patients with abdominal injury had markedly elevated urinary nitrogen at 24 hr. Gastric juice protein output at 72 hr was two to three times greater in patients with more severe and abdominal injuries than in patients with less severe and cranial injury. Sodium and urea concentrations paralleled protein content, suggesting increased permeability. 17-Hydroxycorticosteroid excretion increased only after 24 hr in patients having more severe injuries and those with abdominal injuries, while it was increased earlier in patients with less severe and cranial injuries. Similar patterns existed for 17-ketogenic steroid and 17-ketosteroid. There were no significant changes in blood gases or in coagulation factor regardless of site or severity of injury. It is concluded that the gastric mucosa must be protected by gastric antacids and/or gastric aspiration before 24 hr after trauma and continued through at least 72 hr.

8696 TESTING OF A NEW ANTACID WITH THE HEIDELBERGER CAPSULE IN HEALTHY PERSONS. (Ger.)

Aenishanslin, H. W.; Stalder, G. A. (Medizinische Universitats-Poliklinik, Hebelstrasse 1, 4056 Basel, Switzerland). *Praxis* 64(26):843-847; 1975.

Experiences with a new antacid, Andursil®, in 20 healthy volunteers with a Heidelberger capsule are reported. Each 5 ml of the antacid contains 200 mg aluminum hydroxide and 200 mg magnesium hydroxide in suspension, 200 mg aluminum hydroxide-magnesium carbonate as a co-dried gel, and 150 mg dimethylpolysiloxane. Its effect was compared with a commercial preparation (Alucol®) by radioprobes after maximal pentagastrin stimulation. Each subject received one dose of Andursil and Alucol on two different days at intervals of 2-10 days. The maximum pH increase was higher for Andursil in 8 of 18, lower in 1 of 18, an the same in 9 of 18; 2 cases failed to respond. Alkali time was longer for Andursil in 5 of 18, shorter in 3 of 18, and the same in 10 of 18. Only the higher pH increase was significantly different, confirming Andursil as the more potent acid buffer.

8697 BASAL AND MEAT EXTRACT PLASMA GASTRIN BEF AND AFTER PARIETAL CELL VAGOTOMY AND SELEC IVE GASTRIC VAGOTOMY WITH DRAINAGE IN PATIENTS WITH DUODENAL ULCER. (Eng.)

Fischer, J. E.; Kragelund, E.; Nielson, A.; Wesdorp, R. I. C. (Harvard Medical Sch., Boston, MA). *Ann. Surg.* 183(2):167-173; 1976

Plasma gastrin (PG) and gastric acid secretion in response to various stimuli were determined before and 2-3 months after surgery in 43 patients with duodenal ulcer. In 32 patients in whom no pyloric stenosis was found, parietal cell vagotomy (PCV) was performed, while 11 patients with varying degre of pyloric stenosis underwent selective vagotomy an pyloroplasty (SV + P). Preoperatively, both groups had comparable mean basal PG values (52 pg/ml in th PCV group and 51 in the SV + P group). After stimu ation with meat extract, the mean PG level of the total group rose to 173 pg/ml at 30 min and was 56 pg/ml by 90 min. Postoperatively, the mean basal PG level increased significantly in both groups (107 pg/ml in the PCV group, $p<0.02$; 152 in the SV + P group, $p<0.05$). After stimulation with meat extract, the mean PG in the PCV group was 260 pg/ml at 30 min and 117 pg/ml at 90 min, while in the SV + P group, the PG was 300 pg/ml at 30 min and 126 pg/ml at 90 min. The gastrin response to meat extract was not significantly different between the two groups. Postoperatively, the acid secretion respon to all stimuli was reduced. Basal acid secretion in the PCV group was only 0.9 mEq/hr. This rose to 3.6 mEq/hr after meat extract stimulation and to

.8 mEq/hr after pentapeptide stimulation. Insulin-
imulated secretion was reduced 92% (2.5 mEq/hr).
the SV + P group, the basal acid secretion was
7 mEq/hr. Following insulin stimulation, only 1.1
q/hr was secreted, and following meat extract stim-
ation the value was 1.3 mEq/hr. There was no
gnificant difference in basal and meat extract
imulated PG levels between insulin-negative and
sulin-positive patients in both treatment groups.
ter PCV, there was a positive relation (correl-
ion coefficient=0.62) between meat extract-stimu-
ted PG levels and gastric acid response with a slope
gnificantly different from zero (p=0.05).

98 ELECTROGASTROENTEROGRAPHIC STUDY OF
TOMODA, HENLEY AND OMEGA ANASTOMOSES
TER TOTAL GASTRECTOMY. (Fre.) Martin, A.; Deroche,
; Perissat, J.; Doutre, L. P.; Murat, J.; Moline,
(C.H.U. Bretonneau, F 37000 Tours, France). *Med.*
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99 OPTIMIZING RESULTS OF GASTRIC BYPASS.
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l Nehru Medical Coll., Aligarh, U.P., India).
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8722 ENZYMATIC DISSOLUTION OF PHYTOBEZOARS. (Eng.) Stanten, A.; Peters, H. E., Jr. (400 29th St., Oakland, CA 94609). *Am. J. Surg.* 130(2):259-261; 1975.

8723 HISTOLOGICAL AND HISTOCHEMICAL FINDINGS OF THE GASTRIC MUCOSA IN DUODENAL REGURGITATION. (Eng.) Aste, H.; Molinari, F. (Ospeda San Martino, Genova, Italy). *Endoscopy* 7(2):68-7 1975.

8724 LONG-TERM RESULTS OF PATIENTS OPERATED WITH EXTRAMUCOSAL PYLOROTOMY FOR HYPERTROPHIC STENOSIS OF THE PYLORUS. (Ita.) Gugliel M.; Perrino, G.; Cordioli, G. P.; Valente, R.; Bernardi, R.; Previtera, C. (Istituto di Clinica Chirurgica Generale e di Terapia Chirurgica, Univ sita di Padova, Padova, Italy). *Chir. Ital.* 27(5 471-483; 1975.

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8726 ROLE OF PYLORIC REFLUX IN EXPERIMENTAL STRESS ULCERATION DURING HAEMORRHAGIC SHOCK. (Eng.) Kivilaakso, E.; Kalima, T. V.; Lempinen, M. (Second Dept. Surgery, Univ. Central Hosp., Haartmaninkatu 4, SF-00290 Helsinki 29, Finland). *Eur. Surg. Res.* 7(3):129-135; 1975.

8727 PRIMARY TUBERCULOSIS OF STOMACH (A CASE REPORT). (Eng.) Talib, S. H.; Chawhan R. N.; Zaheer, A.; Talib, V. H. (Medical Coll., Aurangabad [Maharashtra State], New Delhi, India). *Jr. Assoc. Physicians India* 23(4):291-293; 1975.

See also, 8433, 8488, 8604, 8605, 8628, 8646, 864 8666, 8676, 8677, 8678, 8680, 8681, 873 8734, 8735, 8742, 8744, 8748, 8750, 901 9026, 9040, 9114, 9117, 9186.

STOMACH

Peptic Ulcers

8728 A COMPUTERIZED QUESTIONNAIRE ANALYSIS OF DUODENAL ULCER SYMPTOMS. (Eng.) Earlam, R. (London Hosp., Whitechapel, London, E1 1BB, England). *Gastroenterology* 71(2):314-317; 1976.

The characteristics, daily routine, and symptoms of 100 duodenal ulcer patients were compared with those of 100 controls to analyze the life styles of patients and controls. There were no significant differences between the patients and controls in age, weight, height, lean body mass, surface area, nationality, religion, marital status, tobacco or alcohol consumption, occupation, or in the amount of night work, shift work, or overtime

e. All ulcer patients had suffered from abdominal
n due to indigestion during the daytime. Thirty-
had bled from the intestinal tract, and 11 had
forated ulcers. Sixteen had an ulcer history of
r or less, and 35 had an ulcer history of longer
n 15 yr. Forty-six patients had one or more
atives with ulcers, compared with eight in the
trol group. Fifty-seven patients had attacks of
n lasting less than 4 weeks, and the same propor-
n had relief for a similar period. Seventy-four
ients said that the pain was worse with worry,
64 thought that it was unchanged during vaca-
ns. In 24, indigestion was worse in winter, but
thought that there was no seasonal variation.
nty-three patients had pain immediately before
eal, 16 had pain 0-1/2 hr following the meal,
had pain 30 min-1 hr following the meal, and 13
pain 1-2 hr following the meal. The pain made
patients eat less and 19 eat more. The mean
ght of those with ulcers (67 kg) was significant-
less than that of controls (72 kg) at the 1%
el, but not at 0.5%. Eighty ulcer patients said
indigestion was helped if fried foods were
ided, and 64 avoided particular foods, including
try, cucumbers, curry, and onions. Heartburn
urred in 59 patients. Regurgitation of gastric
tents into the mouth occurred in 64 patients and
associated with heartburn in 29. Eighty-eight
ients were awakened at night by indigestion, while
e of the controls were awakened for this reason.
nty-seven patients had nocturnal pain lasting
en or more consecutive nights, 24 had pain three
four times a week, 21 had pain one or two nights
eek, and 16 had pain one night a month or less.
evidence suggests that there are several clinic-
characteristics of duodenal ulceration, independ-
of the daily routine of life, which might be
ful in measuring the severity of the disease
cess.

9 NATURAL HISTORY AND MORPHOLOGY OF SECRETA-GOGUE-INDUCED DUODENAL ULCERS IN RATS.

g.) Gaskin, R. J.; Gad, A.; Barros D'Sa, A. A.
Joffe, S. N.; Baron, J. H. (Dept. Surgery, Royal
tgraduate Medical Sch., Hammersmith Hosp., London
2 OHS, England). *Gastroenterology* 69(4):903-
; 1975.

animal-model duodenal ulcer comparable with the
an disease was prepared, and the time course of
ntaneous healing of these ulcers was studied.
phologically typical ulcers were produced in the
st part of the duodenum in 300 male Wistar rats
a 24-hr s.c. infusion of pentagastrin (4 μg/kg/
) and carbachol (0.8 μg/kg/min). Groups of ani-
s were killed daily for 14 days, and their stom-
s and duodenums were removed, opened, and exam-
d macroscopically and microscopically. The
ions were graded on a seven-point scale of in-
asing severity according to the gross character-
ics: 0, normal; 1, inflammation; 2, petechiae;
erosions; 4, definite ulcer crater; 5, penetra-
g ulcer; and 6, perforated ulcer. All 67 animals
mined at the end of the 24-hr infusion developed
or more definite ulcers (grades 4-6) in the
st part of the duodenum. In one-third of the rats, the second and third parts were involved as well, and gastric ulcers were found in two animals. Of the 300 rats studied, 34% died with grade 6 ulcers within 48 hr. Ulcer healing began on the first postinfusion day, when 3 of the 46 rats studied had only grade 3 lesions. After the fifth day, the few remaining grades 5 and 6 lesions were those that had perforated and sealed spontaneously. Healing was essentially complete, with no macroscopic ulcers, by the end of 14 days. The acute lesions produced were macroscopically and microscopically comparable to the acute duodenal ulcers seen in man, and some of the persistent ulcers, such as those that had perforated and sealed spontaneously, were in many ways similar to chronic duodenal ulcers in man. This model may prove to be a valid system for testing the efficacy of various medical or surgical regimens for healing duodenal ulcers.

8730 EXPERIMENTAL CHRONIC GASTRIC ULCER DUE TO ISCHEMIA IN RATS.

(Eng.) Guth, P. H.; Paulsen, G.; Foroozan, P. (691/111C, Veterans Admin. Wadsworth Hosp., Los Angeles, CA 90073). *Am. J. Dig. Dis.* 20(9):824-834; 1975.

The gross and histologic sequences of tissue injury and repair were studied following the induction of chronic gastric ulcers in male Wistar rats by ischemia. The left and right gastroepiploid arteries and veins of fasted, anesthetized rats were ligated; control rats were sham-ligated. The animals were sacrificed at intervals between 1 hr and 12 months postoperatively, and the lesions and stomach were examined. Lesions developed in all ligated rats, solely in the corpus of the stomach. Small hemorrhagic areas appeared in half the animals within 1 hr of ligation, in three-fourths of the animals within 4 hr, and in all the animals within 8 hr. At 8 hr, the erosions were often linear, and free blood was present in the lumen of the stomach; by 2 days, there were large corpus hemorrhagic erosions; at 3-5 days, there were single, large ulcers involving nearly the entire corpus. In the ulcerated area, the mucosa and muscularis mucosae were destroyed, thick granulation tissue filled the submucosa, and the muscularis propria was severely damaged. Progressive healing occurred after the fifth day, and 75% of the ulcers showed complete gross healing in 2-8 weeks. Histologically, healing and mucosal regeneration occurred by the outgrowth of a layer of cells from the adjacent intact epithelium extending over the surface of the ulcer. Invaginations from this covering layer of cells formed a glandular mucosa composed of mucous cells. Later, parietal and chief cells appeared, and eventually (after about 6 months) a normal corpus-type mucosa covered the entire corpus. With time, smooth-muscle fibers appeared in the outer half of the dense submucosal granulation tissue and, within 6-12 months, a normal muscularis mucosae, submucosa, and muscularis propria were present. These studies show that ischemia can give rise to chronic gastric ulcers, and that all elements of the gastric wall, including the mucosa, muscularis mucosae, and the muscularis propria, can regenerate fully.

8731 PEPTIC ULCER IN CHILDREN WITH GASTRIC TUBE INTER-POSITION.

(Eng.) Anderson, K. D.; Randolph, J. G.; Lilly, J. R. (Children's Hosp. Natl. Medical Center, 2125 13th St., N.W., Washington, DC 20009). *J. Pediatr. Surg.* 10(5):701-707; 1975.

Two cases involving frank ulceration of a gastric tube in children are reported. A 3-yr-old girl sustained a severe esophageal burn following the ingestion of liquid lye. A reverse gastric tube, positioned behind the root of the left lung, was constructed to bypass the strictured esophagus, and the child resumed p.o. feedings and rapidly gained weight. Postoperative barium studies showed some redundancy of the tube in the chest above the diaphragm, but there was an unimpeded flow of barium into the stomach. A contrast study performed 1 yr later, when the patient had developed persistent hematemesis, showed an ulcer crater with radiating edematous folds in the posterior redundant portion of the gastric tube, as well as delayed emptying of the tube through the diaphragm. Her symptoms resolved following treatment with a standard antacid regimen and elevation of the head of the bed. An 18-month-old boy also developed an esophageal stricture after ingesting lye. The esophagus was diverted, the esophagogastric junction was transected and oversewn, and a retrosternal gastric tube was constructed to bypass the destroyed esophagus. Two months later, the patient experienced hemorrhage from the tube through a persistent cutaneous fistula at the cervical anastomosis. The anastomosis was stenotic and refractory to dilatation. A barium study showed narrowing of the gastric tube at the diaphragm. The tube was removed, replaced beneath the sternum, and reanastomosed in the neck. Six months later, a follow-up esophagogram showed stricture and ulceration in the midportion of the tube. The gastric tube was abandoned, and a colon interposition was carried out through the chest. The patient has done well since. It is important to recognize early ulcer formation by serial radiographs throughout the childhood years. While redundancy and partial obstruction with impaired drainage of the tube appear to be etiologic factors, distension of the transposed antrum may lead to hyperacidity and may play a role in ulcerogenesis. A course of dietary and antacid therapy may heal the ulcer, but surgical revision of the tube may be necessary.

8732 BENIGN GASTRIC ULCER WITH "CRESCENT" (QUARTER MOON) SIGN.

(Eng.) Han, S. Y.; Witten, D. M. (Univ. Alabama Sch. Medicine, Birmingham, AL 35233). *Radiology* 113(3):573-575; 1975.

Three cases of benign gastric ulcer with Nelson's "crescent sign" (quarter moon) are reported, with emphasis on the characteristic fluoroscopic and radiographic findings. A 36-yr-old woman was hospitalized with a 1-month history of anorexia and weight loss and a 1-week history of pain in the left lower quadrant of the abdomen. An ill-defined tender mass was palpated in the left lower quadrant, and the hematocrit was 25%. Barium examination revealed a large collection of barium in a quarter-moon-shaped crater on the greater curvature of the antrum. At surgery, a large ulcer crater measuring 10 x 15 cm was found, with the transverse colon, omentum, and transverse mesocolon adherent to it. Duodenostomy was carried out, together with excisio of the ulcer, which proved benign. A 50-yr-old woman was hospitalized with a short history of weak ness, passage of black stools, and vomiting of bright red blood. Two years previously, she had undergone cholecystectomy, common duct exploration, and sphincterotomy. The hematocrit was 19%, and a gastrointestinal series revealed two ulcers on the greater curvature of the antrum. The collection of barium within the larger crater was concave toward the lumen and convex away from the lumen. The smaller and distal ulcer was in the pyloric antrum. Both showed inflammatory tissue with no evidence of malignancy. A 50-yr-old man presented with a 2-day history of hematemesis. He was a heavy drinker and had a 25-yr history of epigastric discomfort. The liver was palpable below the costal margin, the hematocrit was 30.2%, and the hemoglobi was 10 g/100 ml. Barium examination disclosed a large crater on the greater curvature of the antrum with a "crescent sign." The ulcer was benign. In all three cases, the edema of the mucosa overhangin the ulcers was so extensive that the orifice of the crater was almost occluded, and gradual or delayed filling of the crater occurred during barium fluoroscopy. Undermining and edema of the mucosa aroun the crater appears to be reliable evidence of a benign ulcer. Care must be taken to avoid confusio of the crescent sign of a benign gastric ulcer with Carman's meniscus sign of a malignant ulcer.

8733 ENDOSCOPIC ELECTROCOAGULATION OF BLEEDING GASTRIC ULCERS IN INOPERABLE PATIENTS.

(Ger.) Bossart, R.; Gyr, N.; Thurnherr, N. (Kanton spital, CH-4000 Basel, Switzerland). *Z. Gastroenterol.* 13(5):526-528; 1975.

Experiences with endoscopic electrocoagulation (EC) in five geriatric patients with inoperable bleeding gastric ulcers are reported. Localization was either infracardial or supra-angular. Four patient were in hypovolemic shock; all were acutely anemic, with a bleeding duration of 3-9 days. All were cardiac deficient or had decompensated liver cirrho sis. Hemostasis was achieved in four patients. In another patient with gastric polyposis, a massive polyp bleeding from erosion was successfully electr coagulated. Superficial EC of gastric ulcers is often successful and represents an alternative in patients at high surgical risk; it can provide time for further clarification or risk of optimizat

8734 NATURE OF UPPER GASTROINTESTINAL HEMORRHAGE IN CHIANG MAI UNIVERSITY HOSPITAL.

(Eng.) Klunklin, K.; Sivasomboon, B.; Pornputhkul, K. (Chiang Mai Hosp., Chiang Mai, Thailand). *J. Med. Assoc. Thailand* 58(5):243-247; 1975.

8735 DUODENAL ULCER IN RURAL HAITI: I. CLINI AL FEATURES. II. GASTRIC SECRETORY STUDIES.

(Eng.) Reilly, P. C., Jr.; Catino, D.;

chaefer, R. A. (New York Hosp.-Cornell Medical
enter, New York, NY). *J. Trop. Med. Hyg.* 78(10/11):
27-230; 1975.

736 KININ SYSTEM OF THE BLOOD IN ULCER PATIENTS.
(Rus.) Geller, L. I.; Kohzev, V. S. (Khar-
ov Medical Inst., Kharkov, USSR). *Klin. Med.* 53
10):56-59; 1975.

737 RELATIONSHIP BETWEEN ADRENERGIC FIBERS AND
THE PRODUCTION OF EXPERIMENTAL GASTRIC
LCER. (Eng.) Suzuki, K.; Takahashi, Y.; Nakayama,
; Nishimura, Y.; Kinebuchi, M.; Shimada, T.; Wata-
abe, T. (Showa Univ., Sch. Medicine, 1-5-8,
atanodai, Shinagawa-ku, Tokyo, Japan). *Gastroenter-*
. Jpn. 9(4):403-406; 1974.

738 THE ACCURACY OF METHODS OF DIAGNOSIS IN
PATIENTS WITH SUSPECTED RECURRENT ULCER
FTER VAGOTOMY. (Eng.) Steinberg, D. M.; Green,
; Toye, D. K. M.; Alexander-Williams, J. (Royal
erth Hosp., Western Australia). *Aust. N.Z. J.*
urg. 45(3):252-256; 1975.

739 UNCOMPLICATED GASTRODUODENAL ULCERS AND
THEIR MEDICAL TREATMENT. (Fre.) Petite,
P. (Hopital Broussais, 75014 Paris, France).
ev. Med. 16(31/32):2151-2166; 1975.

740 SURGICAL TREATMENT OF GASTRODUODENAL ULCER.
(Fre.) Hovasse, P. (Groupe hospitalier
ochin-Port-Royal, 27, rue du faubourg St-Jacques,
014 Paris, France). *Rev. Med.* 16(31/32):2167-
70; 1975.

741 SURGICAL MANAGEMENT OF BLEEDING GASTRIC
AND DUODENAL ULCER--WITH SPECIAL REFERENCE
INDICATIONS FOR OPERATION. (Eng.) Sekine, T.;
mazaki, T.; Tsukui, H.; Sato, T. (Tohoku Univ.
h. Medicine, 1-1, Seiryomachi, Sendai, Japan).
stroenterol. Jpn. 9(4):395-402; 1974.

42 SOCIAL AND OCCUPATIONAL CONSEQUENCES OF
PARTIAL GASTRECTOMY FOR GASTRIC OR DUODE-
L ULCER. (Fre.) Dupuy, R.; Vallin, J. (Hopital
aujon, 100, boulevard du General-Leclerc, F 92110
ichy, France). *Arch. Fr. Mal. App. Dig.* 64(8):
3-657; 1975.

43 GASTRIC ULCER SURGERY: VITAMIN B_{12}
ABSORPTION AFTER PARTIAL GASTRECTOMY
THOUT PYLORUS INVOLVEMENT. (Pol.) Dzienis, H.;
lloczko, A.; Puchalski, Z.; Orlowski, K. (Insty-
t Chirurgii AM, 15-276 Bialystok, ul. Sklodowskiej
a, Poland). *Pol. Przegl. Chir.* 47(12):1541-1546;
75.

44 REHABILITATION FOLLOWING GASTRECTOMY FOR
PEPTIC ULCER. (Rus.) Petrik, E. I. (No
filiation given). *Khirurgiia (Mosk.)* (6):39-41;
75.

8745 NEW DRUGS IN THE TREATMENT OF PEPTIC ULCER: CARBENOXOLONE SODIUM AND METIAMIDE. (Por.) Moraes-Filho, J. P. P.; Meirelles-Filho, J. de S. (Instituto de Gastroenterologia de Sao Paulo, Rua Silvia, 276, 01331, Sao Paulo, SP, Brazil). *Arq. Gastroenterol.* 12(3):151-153; 1975.

8746 EFFECT OF METIAMIDE ON BASAL AND MEAL-STIMULATED SERUM CHOLECYSTOKININ LEVELS IN DUODENAL ULCER PATIENTS. (Eng.) Harvey, R. F.; Spence, R.; Celestin, L. R. (Bristol Royal Infirmary, Bristol, England). *Biol. Gastroenterol. (Paris)* 8(4):360-361; 1975.

8747 CLIDINIUM BROMIDE AND CHLORDIAZEPOXIDE IN THE TREATMENT OF DUODENAL ULCER: CLINICAL INVESTIGATIONS UTILIZING MAXIMAL HISTAMINE TEST AND UROPEPSINOGEN DETERMINATION. (Eng.) Sezer, R.; Acanal, H. (Ic Hastaliklari Kursusu, Istanbul Tip Fakultesi, Capa, Istanbul, Turkey). *Med. Bull. Istanbul* 8(1):26-31; 1975.

8748 GLYCOPEPTIDE SULFATE IN THE TREATMENT OF GASTRITIS AND GASTRIC AND DUODENAL ULCER. (Ita.) Buonincontro, A.; Confetto, V.; Atelli, A.; Foglia, M.; Ferrara, G.; Romano, E. (Ospedale S. Maria della Pieta, Nola, Italy). *Minerva Gastroenterol.* 21(4):266-276; 1975.

8749 PRELIMINARY ENDOSCOPIC EVALUATION OF THE ANTIULCER ACTION OF SULGLYCOTIDE. (Ita.) Mirelli, E.; Fichera, G. (Ospedale Maggiore, Milan, Italy). *Minerva Gastroenterol.* 21(6):235-242; 1975.

8750 RESULTS WITH TRITHIOZINE (ISF 2001) IN GASTRODUODENAL DISEASES. (Ita.) Barbara, L.; Corinaldesi, R.; Miglioli, M.; Guidoboni, R.; Luchetta, L.; Lami, F.; Labo, G. (Istituto di Clinica Medica e Gastroenterologia, Universita di Bologna, Bologna, Italy). *Minerva Gastroenterol.* 21(4):169-183; 1975.

8751 GASTRODUODENAL ULCER COMPLICATIONS. (Fre.) Hovasse, P. (Groupe Hospitalier Cochin-Port-Royal, 27, rue du Faubourg St-Jacques, 75014 Paris, France). *Rev. Med.* 16(31/32):2173-2177; 1975.

8752 GASTRIC ULCER IN THE COURSE OF MEASLES. (Ita.) Pesce, G.; Tessore, G.; Oliveri, M. (Ente Ospedaliero S. Paolo di Savona, Ospedale Generale Provinciale, Savona, Italy). *G. Mal. Infett. Parassit.* 27(9):831-838; 1975.

See also, 8483, 8623, 8696, 8697, 8712, 8715.

8753 THE INFLUENCE OF ORALLY APPLICABLE ANTIBIOTICS ON THE ACTIVITIES OF HUMAN ENTEROKINASE AND DISACCHARIDASES.

(Ger.) Niessen, K. H.; Sayer, T.; Schunder, E. (Univ.-Kinderklinik, Rumelinstr. 23, 7400 Tubingen, W. Germany). *Arzneim. Forsch.* 26(6):1216-1221; 1976.

The effect of 14 different antibiotics on the enterokinase (EK), lactase (LT), saccharase (SH), and isomaltose (IM) activities of human intestinal mucosa is discussed. All tests were performed on duodenal mucosa sectioned immediately after autopsy, with antibiotic concentration that were 50% inhibitory of enzyme activity. Phenoxymethylpenicillin inhibited EK at 2.1×10^{-2} M but not LT, SH, or IM at 3×10^{-2} M. α-Phenoxypropylpenicillin affected EK at 4.8×10^{-2} M and LT at 1.35×10^{-1} M. EK was inhibited by 1.3×10^{-2} M, SH by 6.5×10^{-2} M, IM by 7.5×10^{-2} M, and LT by 5.5×10^{-2} M of 5-methyl-3-phenyl-4-isoazolylpenicillin. SH, IM, and LT were not affected by 1×10^{-1} M α-aminobenzylpenicillin, but EK was inhibited at 5.0×10^{-2} M. 7-(2-Thienylacetamido)cephalosporin affected EK at 1.5×10^{-3} M, SH at 3.6×10^{-2} M, IM at 5.0×10^{-2} M, and LT at 2.4×10^{-2} M (100% inhibition). EK was inhibited by 3.4×10^{-2} M of 7-(D-α-amino-α-phenylacetamido)-3-methyl-3-cephem-4-carboxylic acid, but 1.0×10^{-3} M of 6-deoxy-5-hydroxytetracycline arrested EK and 2.0×10^{-2} M, 1.2×10^{-2} M, and 1.1×10^{-4} M inhibited SH, IM, and LT, resp. Neomycin-B sulfate was inhibitory of EK, SH, IM, and LT at 3.24×10^{-4} M, 3.2×10^{-1} M, 1.6×10^{-1} M, and 3.25×10^{-1} M, resp. Gentamycin sulfate and polymyxin-E sulfate did not affect SH, IM, or LT at 1×10^{-1} M or 1×10^{-3} M, resp., but it did inhibit EK at $1.45\text{-}1.83 \times 10^{-4}$ M. Polymyxin-B sulfate affected EK, SH, IM, and LT at 1.12×10^{-4} M, 1.2×10^{-1} M, 8.5×10^{-3} M, and 7.0×10^{-2} M, resp. Erythromycin glucoheptonate inhibited EK at 5.1×10^{-3} M. EK was 50%; SH, 20%; IM, 40%; and LT, 20% inhibited by $1.2\text{-}1.26 \times 10^{-1}$ M; resp. The effect of chloramphenicol occurred at molar concentration of 1.26×10^{-2}, 1.1×10^{-1}, 1.3×10^{-1}, and 6.5×10^{-2} for EK, SH, IM, and LT, resp. The inhibitory mechanism was unaffected by cholic acid binding. Neomycin and polymyxin inhibition was competitive; inhibition by the penicillins, cephalosporins, and tetracycline was noncompetitive.

8754 ALPHA-CHAIN DISEASE WITH INTESTINAL INVOLVEMENT. REPORT OF A CASE WITH CLINICAL, HISTOLOGICAL AND IMMUNOLOGICAL RECOVERY AFTER TREATMENT WITH ANTIBIOTICS.

(Fre.) Monges, H.; Aubert, L.; Chamlian, A.; Remacle, J.-P.; Mathieu, B.; Cougard, A.; Arroyo, H. (Hopital Nord, F 13326 Marseille Cedex 3, France). *Arch. Fr. Mal. App. Dig.* 64(3): 223-231; 1975.

The case history of a patient with intestinal involvement of alpha-chain disease is detailed. A 34-yr-old man presented with an acute malabsorption syndrome following a 3-yr history of diarrhea and intermittent abdominal pain. Hepatosplenomegaly was absent and hepatosplenic function was normal. The steatorrhea was 50 g fatty acid/day. The sodium level was 138 mEq/l; potassium, 3 mEq/l; chloride, 90 mEq/l; calcariuria, 34 mg/l; phosphoremia, 26 mg/l; and total cholesterolemia, 1.04 g/l. Barium ingestion showed an abnormal distention of some je nal and ileal loops and jejunal mucosal folds. Biopsy showed either the absence of villi or enlar villi in various jejunal segments. The lamina pr pria was densely infiltrated, predominantly by ATP ase-rich plasmocytes, with a discrete muscularis mucosae infiltration; the submucosa was unaffected Gastric and rectal biopsies were negative. Serum immunoglobulin assay found elevated immunoglobulin A (IgA, 580 mg/100 ml), but normal IgG and IgM. Immunofluorescence of the jejunal sections showed a strong cytoplasmic response to IgA antiserum in the lymphoid cells of the lamina propria. Ampicillin (2 g/day, i.m.), tetracycline (1.5 g/day, p.o. and nystatin (3×10^6 U/day, p.o.) led to clinical amelioration. The serum IgA was normalized (365 100 ml). Indirect immunofluorescence of the lymp plasmocytic elements in the lamina propria showed a reduced level of IgA relative to normal mucosa and the presence of cells containing light kappa- or lambda-chains similar in quantity to normal cells. Within 6 months the patient was considere clinically, histologically, and immunologically cured. The karyotype showed the presence of a 14 + marker, which was not present in siblings or offspring. HL-A8 was positive for a brother but not for the patient.

8755 THE ROLE OF ANGIOGRAPHY IN THE MANAGEME OF INTESTINAL CARCINOID.

(Eng.) Strasberg, Z.; Hyland, J.; Salem, S.; Wilderspin, K.; Tuttle, R. J. (St. Joseph's Hosp., 50 Charlton Ave East, Hamilton, Ontario, Canada). *Angiology* 26(8) 573-583; 1975.

The angiographic features in two cases of carcino tumors of the intestine are presented. A 74-yr-o woman was hospitalized with a 4-yr history of int mittent diarrhea associated with crampy abdominal pain. Physical examination revealed an enlarged, firm, irregular liver with many nodules, a murmur over the pulmonary valve, and evidence of right heart failure. Serum albumin was 2.5 g%, alkalin phosphatase was 150 U, and urinary 5-hydroxy-indo acetic acid was 20 mg/24 hr. An abdominal series was consistent with partial small bowel obstructi and a liver scan revealed multiple areas of decreased uptake. Selective superior mesenteric angiography revealed narrowing of the major ileocolic branches of the superior mesenteric artery, poor to moderate accumulation of contrast, poor filling in the venous phase, and a stellate appea ance of the vasa recta and arcade branches of the superior mesenteric artery. Selective hepatic arteriography revealed multiple vascular nodules the liver and tumor vessels, with the tumor blush persisting into the capillary phase. At surgery, an intramural nodule, later confirmed as a carcin tumor, was identified about 4 cm from the ileo-ce valve; the liver was studded with metastases, and a stricture of the bowel was confirmed. A 28-yr- woman presented with a 4-yr history of hemorrhagi rash, episodic flushing and diarrhea, and a tende to cyanosis on exposure to cold. The liver was enlarged and nodular and the urinary 5-hydroxy-

leacetic acid was 112 mg/24 hr. Angiography
aled several vascular lesions in the liver,
ding of the intrahepatic branches, a vascular
le to the left of the midline, and a tumor blush
persisted into the venous phase. At surgery,
rcinoid lesion was identified at midileum, with
iple metastases in the liver and involvement of
regional nodes. In conjunction with previously
rted cases, these indicate that relatively
ific angiographic criteria exist for the detec-
of the primary tumor. Angiography can also be
ul for localizing hepatic metastases and the
ries of hepatic blood supply. Angiography is
cated in patients with intestinal carcinoid
r to surgery or radiotherapy.

USE OF JEJUNAL NEOMUCOSA IN THE TREATMENT
OF THE SHORT GUT SYNDROME IN PIGS. (Eng.)
ington, H. B.; Tumbleson, M. E.; Ternberg, J. L.
hington Univ. Sch. Medicine, 4960 Audubon Ave.,
Louis, MO 63110). *J. Pediatr. Surg.* 10(5):617-
1975.

est the effectiveness of the jejunal neomucosa
meliorating the short gut syndrome, young Sin-
r (S-1) miniature pigs underwent small bowel
ction and subsequent patching (6 weeks later) of
junal incision with intact colon. The small
l was examined grossly and histologically at
psy 28 weeks after the original resection. The
age length of bowel remaining after resection
182 cm in the control pigs (no subsequent patch-
with colon) and 185 cm in the experimental
als. At sacrifice, the small bowel was signifi-
ly longer in the controls (268 cm versus 236
There was no disproportionate dilatation in
small intestine proximal to the patched jejunum,
the small bowel diameter doubled from 1.5 to
cm in both groups. Most blood values were normal
oth groups, although variations from normal in
blood urea nitrogen and inorganic phosphorus
ls were present in both groups within 4-6 weeks
esection. Within 11 weeks of patching, however,
experimental animals had gained significantly
weight than the controls, and this difference
maintained throughout the experiment. The new
sa in the experimental animals grossly resembled
adjacent normal mucosa, although somewhat flat-
d areas and a few ulcerated areas were focally
ent. Histologically, there were changes suggest-
of chronic irritation: increased goblet cells,
short and blunted villi, areas of increased
t:villus ratio, and a few areas of gastric meta-
ia.

DUODENAL-JEJUNAL ULCERS AND RECURRENT
HEMORRHAGE: DIAGNOSTIC VALUE OF TOTAL
ROSCOPY. (Eng.) Conley, D. R.; Feffer, M.;
, H. (Cedars-Sinai Medical Center, Mt. Sinai
. Div., 8720 Beverly Blvd., Los Angeles, CA
3). *Am. J. Dig. Dis.* 20(9):876-881; 1975.

se of recurrent, life-threatening gastrointes-
l hemorrhage from multiple jejunal ulcers is
rted. A 42-yr-old woman developed melena while
convalescing from aortic valve prosthetic surgery. Two months later, the patient noted hematochezia, and a posterior-wall duodenal ulcer was found at laparotomy. A vagotomy and pyloroplasty were performed, and the bleeding stopped. The bleeding recurred 2 yr later, and during the ensuing 9-month period, the patient was hospitalized on six occasions because of melena and anemia. Repeat gastrointestinal x-rays were negative, and physical and laboratory findings were normal. A Cantor tube was inserted into the first portion of the duodenum and allowed to transit through the small intestine. Midway through the jejunum, the small bowel aspirate became benzidine-positive, suggesting that the bleeding site was the small intestine. A new colonoscopy technique was used. The fiberoptic colonoscope was introduced into the sigmoid colon at the time of operation and was passed through the ileocecal valve. The small intestine was then guided over it, allowing the visualization of the entire small intestinal mucosa. This technique revealed multiple hemorrhagic punched-out ulcers in the midportion of the jejunum. These ulcers extended into the third and fourth portions of the duodenum, but no lesions of the esophagus, stomach, or duodenal bulb were noted. There were no serosal abnormalities of the small intestine. The involved section of the jejunum was resected, and an end-to-end anastomosis was performed. Three months later, multiple jejunal ulcerations were found distal to the previous line of anastomosis, and multiple duodenal ulcerations were also noted. Resection of the duodenum, distal stomach, and involved jejunum failed to prevent recurrence of the bleeding episodes. Microscopically, the jejunal ulcers consisted of a bland, noninflammatory disruption of the mucosa with focal subjacent submucosal hemorrhage. There was virtually no exudate; angitis, vascular thrombosis, granuloma, or foreign material was not identified; and cultures and stains for amyloid, fungi, and acid-fast organisms were negative. The cause of the ulcerations in this case is unknown.

8758 SATIETY AND HUNGER INDUCED BY SMALL AND LARGE DUODENAL LOADS OF ISOTONIC GLUCOSE. (Eng.) Rezek, M.; Havlicek, V.; Novin, D. (Dept. Physiology, Univ. Manitoba, Winnipeg, Manitoba, R3E OW3, Canada). *Am. J. Physiol.* 229(3):545-548; 1975.

8759 INTESTINAL ANASTOMOSES IN NEONATAL SURGERY. (Eng.) Bell, R. H.; Johnson, F. E.; Lilly, J. R. (Univ. Colorado Medical Center, Denver, CO). *Ann. Surg.* 183(3):276-281; 1976.

8760 VITAMIN B_{12} ABSORPTION IN PATIENTS WITH ILEAL CONDUITS. (Eng.) Rogers, A. C. N.; Steyn, J. H. (Aberdeen Royal Infirmary, Foresterhill, Aberdeen AB9 2ZB, Scotland). *Eur. Urol.* 1(1):49-52; 1975.

8761 EFFECTS OF SOME DRUGS ON ELECTRICAL ACTIVITY OF THE GUT IN THE POSTOPERATIVE PERIOD. (Eng.) Dauchel, J.; Schang, J. C.; Kachelhoffer, J.;

Eloy, R.; Grenier, J. F. (Service d'Investigations chirurgicales, Hospices civils, F-67005 Strasbourg, France). *Eur. Surg. Res.* 8(1):26-38; 1976.

8762 MULTIPLE GASTROINTESTINAL ATRESIAS, WITH INTRALUMINAL CALCIFICATIONS AND CYSTIC DILATATION OF BILE DUCTS: A NEWLY RECOGNIZED ENTITY RESEMBLING "A STRING OF PEARLS." (Eng.) Martin, C. E.; Leonidas, J. C.; Amoury, R. A. (Univ. Missouri Kansas City Sch. Medicine, Children's Mercy Hosp., 24th and Gilham Rd., Kansas City, MD 64108). *Pediatrics* 57(2):268-271; 1976.

8763 INTESTINAL ATRESIA DUE TO INTRAUTERINE INTUSSUSCEPTION: ANALYSIS OF 24 CASES IN JAPAN. (Eng.) Todani, T.; Tabuchi, K.; Tanaka, S. (Okayama Univ. Medical Sch., Okayama, Japan). *J. Pediatr. Surg.* 10(4):445-451; 1975.

8764 PRIMARY ADENOCARCINOMA OF THE JEJUNUM AND ILEUM: A CLINICOPATHOLOGIC STUDY. (Eng.) Bridge, M. F.; Perzin, K. H. (New York Medical Coll., Valhalla, NY). *Cancer* 36(5):1876-1887; 1975.

8765 PRIMARY TUMORS OF THE SMALL BOWEL. (Eng.) Treadwell, T. A.; White, R. R., III. (Scott and White Memorial Hosp., Temple, TX 76501). *Am. J. Surg.* 130(6):749-755; 1975.

8766 ANGIOGENIC TUMOR IN THE SMALL INTESTINE. A CASE REPORT AND REVIEW OF THE LITERATURE PUBLISHED IN JAPAN. (Eng.) Takamura, Y.; Seki, H.; Kasaoka, C.; Kono, T.; Murai, T. (Fujisawa City Hosp., 6-1 Fujisawa 2-chome, Kanagawa Prefecture, 251 Japan). *Gastroenterol. Jpn.* 10(4):342-351; 1975.

8767 ANTIPERISTALTIC BOWEL SEGMENT FOR PREVENTION OF ILEOPROCTOSTOMY DIARRHEA. (Eng.) Tuley, R. D.; Matolo, N. M.; Garfinkle, S. E.; Wolfman, E. F., Jr. (Univ. California Sch. Medicine, Davis, CA 95615). *J. Surg. Oncol.* 8(1):67-73; 1976.

8768 NEOPLASTIC PANETH CELLS: OCCURRENCE IN AN ADENOCARCINOMA OF A MECKEL'S DIVERTICULUM. (Eng.) Scharfenberg, J. C.; DeCamp, P. T. (Alton Ochsner Medical Foundation, New Orleans, LA 70121). *Am. J. Clin. Pathol.* 64(2):204-208; 1975.

8769 MECKEL'S DIVERTICULUM. (Eng.) De Bartolo, H. M., Jr.; Van Heerden, J. A. (Geisinger Medical Center, Danville, PA 17821). *Ann. Surg.* 183 (1):30-33; 1976.

8770 THE PATHOGENESIS OF GLUTEN-SENSITIVE ENTEROPATHY. (Eng.) Strober, W.; Falchuk, Z. M.; Rogentine, G. N.; Nelson, D. L.; Klaeveman, H. L. (Natl. Cancer Inst., Bldg. 10, Rm. 4N-114, Natl. Inst. Health, Bethesda, MD 20014). *Ann. Intern. Med.* 83(2):242-256; 1975.

8771 ILEOCOLIC INTUSSUSCEPTION PRESENTING AS A LEFT UPPER QUADRANT MASS, MASQUERADING AS PANCREATIC PSEUDOCYST. (Eng.) Mencer, E. J.; Loh, C.; McElhinney, A. J. (Bonx Veterans Admin. Hosp., 130 W. Kingsbridge Road, Bronx, NY 10468). *Mt. Sinai J. Med.* 42(6):581-585; 1975.

8772 SPONTANEOUS PERFORATION AND CLOSURE OF TH SMALL INTESTINE IN ASSOCIATION WITH CHILDHOOD LEUKEMIA. (Eng.) Moore, T. C.; Finklestein, J. Z.; Lachman, R.; Hirose, F. (UCLA-Harbor General Hosp., UCLA Sch. Medicine, Torrance, CA). *J. Pediatr. Surg.* 10(6):955-957; 1975.

8773 COMPARATIVE STUDY OF AFRICAN AND ASIAN STATISTICS OF PERFORATION OF THE TERMINAL ILEUM. REPORT OF 75 CASES. (Eng.) Spay, G.; Tou P. (Cliniques Chirurgicales des Facultes Mixtes de Medecine et de Pharmacie, Dakar, Senegal). *Intl. Surg.* 60(11/12):600-603; 1975.

8774 ILEOCOLONIC PERFORATION. A COMPLICATION FOLLOWING RENAL TRANSPLANTATION. (Eng.) Thompson, W. M.; Seigler, H. F.; Rice, R. P. (Duke Univ. Medical Center, Durham, NC 27710). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(3):723-730 1975.

8775 ENTERIC PERFORATION IN TYPHOID FEVER: A STUDY OF 15 CASES. (Eng.) Singh, J.; Singh, B. (Medical Coll., Rajindra Hosp., Patiala, India). *Aust. N.Z. J. Surg.* 45(3):279-283; 1975.

8776 SMALL-BOWEL OBSTRUCTION: A REVIEW OF 46 CASES. (Eng.) Laws, H. L.; Aldrete, J. (Dept. Surgery, Univ. Alabama in Birmingham, Univ. Station, Birmingham, AL 35294). *South. Med. J.* 69 (6):733-734; 1976.

8777 STUDIES OF SUPEROBESITY: II. PSYCHIAT APPRAISAL OF JEJUNO-ILEAL BYPASS SURGER (Eng.) Castelnuovo-Tedesco, P.; Schiebel, D. (Va derbilt Univ. Sch. Medicine, Nashville, TN 37232) *Am. J. Psychol.* 133(1):26-31; 1975.

8778 SURGICAL MANAGEMENT OF MORBID OBESITY: CURRENT CONSIDERATIONS IN THE USE OF EXTENSIVE JEJUNOILEAL BYPASS. (Eng.) Scott, H. W., Jr.; Dean, R. H.; Shull, H. J.; Price, R. R.; Glu F. W.; Abram, H. S.; Webb, W.; Brill, A. B.; Pric R. R. (Vanderbilt Univ. Medical Center, Nashville TN 37232). *South. Med. J.* 69(6):789-798; 1976.

8779 SURGICAL TREATMENT OF OBESITY BY SMALL TESTINAL SHUNTS: A REVIEW. (Eng.) De Luca, L.; Hallberg, D. (Istituto de Semeiotica Ch ırgica dell'Universita di Napoli, Italy). *Surg. Italy* 5(2):86-100; 1975.

3780 THE ESOPHAGEAL AND SMALL-BOWEL MANIFESTATIONS OF PROGRESSIVE SYSTEMIC SCLEROSIS: ı PATHOPHYSIOLOGIC EXPLANATION OF THE ROENTGENOGRAPHIC SIGNS. (Eng.) Olmsted, W. W.; Madewell, J. E. Armed Forces Inst. Pathology, Washington DC 20306). *astrointest. Radiol.* 1(1):33-36; 1976.

8781 CURLING'S ULCER: A RARE CONDITION. (Eng.) Muir, I. F. K.; Jones, P. F. (Royal Aberdeen Children's Hosp., Aberdeen, Scotland). *Br. J. Surg.* 63(1):60-65; 1976.

See also, 8532, 8594, 8628, 8644, 8646, 8647, 8651, 8658, 8680, 8698, 8710, 8711, 8712, 8716, 8721, 8722, 8723, 8738, 8783, 8836, 8876, 9086, 9094, 9095, 9103, 9109, 9118, 9159.

SMALL INTESTINE

Malabsorption

782 QUANTIFICATION OF THE THREE-DIMENSIONAL STRUCTURE OF JEJUNAL MUCOSA IN HEALTHY UBJECTS AND PATIENTS WITH CELIAC DISEASE. (Ger.) iecken, E. O.; Sahlfeld, M.; Lorenz-Meyer, H. Medizinische Universitatsklinik, 355 Marburg/Lahn, annkopffstr. 1, W. Germany). *Dtsch. Med. Wochenschr.* 01(2):51-53; 1976.

icrodissection data on the three dimensional strucure of intestinal mucosa in healthy persons and atients with celiac disease (CD) are presented. he relation between resorbing mucosal surfaces and illi height is more closely defined. Jejunal iopsies from 10 healthy persons and from 4 treated nd 3 untreated CD cases with total or partial illous disappearance were prepared and examined tereomicroscopically. A villous surface below the igament of Treitz average 0.455 mm^2, while the nner surface of villi in the superior jejunum was reater by a factor of 8.3. In untreated CD, the nner surface fell to one per unit of area, the umber of crypts per mm^2 was reduced about 59%, and he crypt depths were increased. In treated sprue, he number of villi was less than normal, but the atio of crypts per villi was within normal range 10.2); crypt depth was nearly doubled. The number f mitoses per crypt was elevated in CD. A highly ignificant positive linear correlation could be stablished between mucosal surface and villous eight, and a negative linear correlation could be stablished between number of mitoses and mucosal rea in healthy and CD intestines. Since villous eight and resorption potential were correlated ositively in earlier studies, it is now possible o infer from villous height to the size of the esorbing mucosal area in biopsy specimens.

783 ENTEROPATHY AND PRIMARY IgA DEFICIENCY. REPORT OF A CASE WITH PROGRESSIVE ATROPHY THE INTESTINAL MUCOSA. (Fre.) Dedieu, P.; Le odic, M. F.; Simon, J.; Le Mevel, B.; de Lisle, L.-.; Miniconi, P. (Hopital Saint-Jacques, F 44200 antes, France). *Arch. Fr. Mal. App. Dig.* 64(4): 47-357; 1975.

The case history of a patient with malabsorption syndrome and primary immunoglobulin A (IgA) deficiency is examined. A 49-yr-old woman with a history of chronic diarrhea and bronchial infection gave evidence of malabsorption, moderate steatorrhea and diminished or absent levels of IgA. Fibroscopy showed duodenal pseudoploidy. The patient's condition was refractory to gluten diets and corticoid therapy. Laparotomy showed an infiltrated jejunal loop, mesenteric adenopathy, and splenomegaly. Jejunal histology showed atrophied villi. Liver function was normal, coproculture negative, and thoracic and abdominal radiology normal. There was diffuse atrophic gastritis. Barium transit found duodenal lacunae. Subsequent jejunal biopsies confirmed progressive total or subtotal villous atrophy without crypt hypertrophy, but with diffuse lymphoid hyperplasia, no plasmocytes, eosinophilia, immature lymphocytosis, and histiocytosis. There was no evidence of autoimmune involvement. In the lamina propria, there was a complete absence of plasmocyte response to IgA and a diminished reaction to IgM. The effect of parenteral vitamin B_{12} was transient. It is suggested that IgA deficit renders the intestinal mucosa more permeable to certain antigens, predisposing the patient to immune reactions in the lamina propria that cause villous atrophy.

8784 WHIPPLE'S DISEASE. HEPATIC GRANULOMATOUS LOCALIZATIONS DETECTED BY LIVER BIOPSY. (REPORT OF TWO CASES). (Fre.) Cornet, A.; Barbier, J.-Ph.; Henry-Biabaud, E.; Malvy, J.-P.; Benisty, H.; Carnot, F. (Hopital Laennec, 42, rue de Sevres, F 75340 Paris Cedex 7, France). *Ann. Med. Interne (Paris)* 127(2):139-146; 1976.

The systemic involvement of Whipple's disease is examined in two case histories. A 53-yr-old man presented with anorexia, fatigue, epigastric heaviness, low grade fever, microcytic anemia, eosinophilia, and elevated sedimentation rate. Liver function was normal. Liver biopsy revealed nonnecrotic, tuberculoid granulomatosis, refractory to isoniazide, rifampicin, and ethambutol. There was a suspicion of abnormality in the first jejunal loop and evidence of steatorrhea. Jejunal biopsy revealed infiltration of PAS-positive macrophages and deformed villi. PAS-positive inclusions were confirmed for the liver, ganglia, and rectal mucosa. Intestinal involvement extended to the pylorus. Tetracycline (2 g/day, p.o.) was begun, and regression of functional signs was manifest in 2 weeks. A 52-yr-old man with a history of arthropathy developed episodic radiating abdominal pain with fever, followed by persistent diarrhea. Barium studies showed jejunal dilatation. Slight anemia, an elevated sedimentation rate, and prominent steatorrhea were the most significant paraclinical irregularities. Intestinal biopsy found an excess of PAS-positive granular macrophages infiltrating and distorting the villi. Transaminase levels were normal. Liver biopsy showed a granulomatosis. Ampicillin, 2 g/day, i.m. and 2 g/day, p.o., led to complete symptomatic regression. The pathogenesis of Whipple's disease is concluded to be associated with an abnormality in marcophage function.

8785 STUDIES ON DIURNAL VARIATION IN PROLIFERATIVE RATES IN THE RAT JEJUNAL MUCOSA [Abstract]. (Eng.) Aldewachi, H. S.; Wright, N. A.; Appleton, D. R.; Watson, A. J. (Dept. Pathology and Medical Statistics, Univ. Newcastle upon Tyne, Newcastle upon Tyne, England). *J. Anat.* 120(2):402; 1975.

8786 SMALL BOWEL MORPHOLOGY AND EPITHELIAL PROLIFERATION IN INTRAVENOUSLY ALIMENTED RABBITS [Abstract]. (Eng.) Eastwood, G. L. (West Roxbury Veterans Admin. Hosp., Boston, MA). *Clin. Res.* 23(5):576A; 1975.

8787 MICROSOMAL CYTOCHROMES OF RAT FUNDIC MUCOSA. THEIR LOCALIZATION IN PARIETAL CELLS [Abstract]. (Eng.) Ghesquier, D.; Lewin, M. (INSER U-10, Hopital Bichat, 170 Bd. Ney, F-75018, Paris, France). *Digestion* 13(3):169; 1975.

8788 CHANGES IN THE RAT SMALL INTESTINE AFTER SUBTOTAL COLECTOMY [Abstract]. (Eng.) Masesa, P. C. (Dept. Physiology, Univ. Edinburgh, Edinburgh, Scotland). *J. Physiol.* 256(1):47p-48p; 1976.

8789 EARLY CYTOLOGICAL CHANGES INDUCED IN RAT LIVER CELLS BY CHEMICALS [Abstract]. (Eng.) Takayama, S.; Masahito, P.; Yamada, K. *In: The 6th International Symposium of the Princess Takamatsu Cancer Research Fund. Fundamentals of Cancer Prevention. November 11-13, 1976.* The Princess Takamatsu Cancer Research Fund (Tokyo, Japan): p. 33, 1975.

8790 IMMUNOFLUORESCENCE STUDY OF PROCOLLAGEN IN LIVER DISEASE [Abstract]. (Eng.) Brunner H.; Penner, E.; Wick, G. (Ordinariat fur Gastroenterologie der Universitat Wien, Vienna, Austria). *Digestion* 12(4/6):268; 1975.

See also, 8633, 8655, 8657, 8701, 8743, 8754, 8770, 8821, 9109, 9115.

LARGE INTESTINE

8791 COLON AND RECTUM. (Eng.) Cutler, S. J. *In: Cancer Epidemiology and Prevention.* (Springfield: Charles C. Thomas): pp. 375-385; 1976.

The incidence rates of colonic and rectal cancers between the late 1940's and the 1960's were obtained from the tumor registry in Connecticut and from seven National Cancer Institute surveys of cancer occurrence in selected metropolitan areas of the United States and compared. Both sets of data indicated that between the late 1940's and late 1960's, the incidence of colon cancer increased by about 25% in white males, but remained at the same level in white females. Both sets of data indicated a decrease in rectal cancer; the Connecticut data showed incidences of 20.1/100,000 and 19.1/100,000 in men and 13.0/100,000 and 12.4/100,000 in women during the periods 1945-1949 and 1965-1968, resp. The seven surveys showed incidences of 19.8/100,000 and 15.5/100,000 in men in 1947 and 1969, resp., and 13.3/100,000 and 9.4/100,000 in women, resp. The data from the seven surveys indicated that between 1947 and 1969 the incidence of colon cancer has doubled in both male and female Negroes. Thus, among men, the increase was appreciably larger in Negroes; among women, ther was a larger increase in Negroes and no increase in whites. As a result of the larger increases among Negroes, the incidence of colon cancer is now at th same level in whites and Negroes (29.6 and 25.0/100,000 in white men and women, resp.; 26.2 and 24. 100,000 in Negro men and women, resp.). The change in the incidence of cancers of the rectum was simil in white and Negro women--down from 13 to 9/100,000 Among men, however, the incidence rate decreased among whites (19.8/100,000 to 15.5/100,000), but di not change among Negroes (12.0/100,00 in 1947 and 1 100,000 in 1969). The incidence rates of rectal an colonic cancer among both Negroes and whites were lower in the southern cities than in the northern or western cities. The observed lower incidence rates in the South, the temporal changes in inciden level in different geographic areas within the Unit States, and the unequal changes in incidence among

ites and Negroes all suggest the influence of en-
ronmental factors.

92 EXFOLIATIVE CYTOLOGY OF THE COLON. (Fre.)
Cabre-Fiol, V.; Aran-Suau, J.; Pujol-Pi,
; Germa, J. R.; Vilardell, F. (Hopital de la Santa
iz y San Pablo, Barcelona 13, Spain). *Ann. Gastro-*
terol. Hepatol. 11(3):235-243; 1975.

periences with exfoliative cytology (EFC) in com-
rison to biopsy, endoscopy, and radiology for the
agnosis of colon carcinoma (CC) are discussed.
C was positive for CC in 87% of 34 confirmed cases,
mpared to 93% for biopsy, 84% for endoscopy, and
% for radiology. In cases of significant inflam-
tory exudate in hemorrhagic rectocolitis, EFC
utinely confirmed the endoscopic evidence. EFC
particularly valuable in rectocolitis and Crohn's
sease of long duration, with their high frequency
CC. In six patients with recurrent colitis, EFC
und cell atypia in four smears and biopsy was
sitive in three. EFC was positive in seven and
opsy in four smears of nine chronic colitis cases.
seven clinical cures, EFC and biopsy were positive
five and four smears, resp.; the persistence of
ypical cells in cured patients is noteworthy.
C is recommended when endoscopic biopsy is nega-
ve.

)3 HYPOTONIC EXAMINATION OF THE COLON WITH
GLUCAGON. (Eng.) Gohel, V. K.; Dalinka,
K.; Coren, G. S. (Thomas Jefferson Univ. Hosp.,
iladelphia, PA). *Radiology* 115:1-4; 1975.

use of glucagon (1-2 mg) to relieve spasms during
otonic examination of the colon was studied in
patients. Glucagon was administered i.m. (90
es) or i.v. (13 cases) 5-8 min before the examina-
n or when an area of narrowing or obstruction was
ountered during the study. Glucagon was uniform-
successful in relieving functional spasm. Only
e patients suffered transient nausea, and no other
e-effects were encountered. In comparison with
pantheline bromide (Pro-Banthine), glucagon offers
er problems in terms of side-effects and contra-
ications. The only known contraindications with
cagon are pheochromocytoma, insulinoma, and war-
in-induced hypothrombinemia. The exact mechanism
the hypotonic effect of glucagon has not been
ermined.

4 VILLOUS ADENOMA OF THE LARGE BOWEL; BENIGN
AND MALIGNANT. (Eng.) Bresnihan, E. R.;
pkins, K. C. (Leeds [St. James's] Univ. Hosp.,
ds, England). *Br. J. Radiol.* 48(574):801-810;
5.

radiologic appearances of 14 villous adenomas
double contrast barium enema examination are re-
ted. Eleven adenomas were benign and 3 were car-
omatous. Two of the tumors occurred in the de-
nding colon and one each occurred in the ascend-

ing colon and transverse colon; the rest were found in the rectum or sigmoid colon. Most of the tumors were between 3 and 8 cm at diagnosis. The radiologic appearance in the villous adenomas was of a large intraluminal filling defect with a fine reticular lace-like pattern; the more solid lobulated tumors showed a coarser mosaic pattern. In one case, the lesion was barely discernible in the proximal transverse colon, and its appearance on the radiograph was mistaken for a coating of fecal material. In another case, basal indentation was present in four cases, all of which were benign, while only one of the malignant tumors showed unequivocal radiological evidence of malignancy, i.e., narrowing of the lumen, with constant rigid bowel wall and mucosal destruction. Large size was not a reliable indicator of malignancy. Of the 14 cases studied, additional neoplasms were diagnosed on the barium enema examination in 7. There were three cases of synchronous carcinoma, one with a previous history of resections for two large bowel carcinomas, two cases of multiple adenomatous polyps, and one case involving a second villous adenoma. The detection of any rectal or colonic neoplasm, especially a villous adenoma, should be followed by examination of the whole large bowel by double contrast barium enema and/or colonoscopy.

8795 VILLOUS TUMOR OF THE RECTUM: A CASE WITH SEVERE HYDROELECTROLYTIC DEPLETION. ULTRASTRUCTURAL STUDY, AND THE PRESENCE OF CARCINOEMBRYONIC ANTIGEN AND IMMUNOGLOBULINS IN THE MUCUS. (Fre.) Bekhti, A.; Boniver, J.; Jacquet, N. (Departement de clinique et de pathologie medicales, Universite de Liege, Liege, Belgium). *Acta Gastroenterol. Belg.* 38(5/6):227-236; 1975.

The ultrastructure and secretory behavior of a rectal villous tumor were analyzed in an elderly woman who presented with a history of rectal polyps, diarrhea, abundant mucus secretion, nausea, vomiting, and dehydration. The sphincter was atonic and a mass was palpable. Rectoscopy found a tumor suspended in viscous fluid that was diagnosed histologically as villous adenoma. The secretory volume varied between 1.5 and 2.5 l/day. Immunoglobulin A (IgA) was found in the mucus fluid, along with high levels (1,000 ng/ml) of carcinoembryonic antigen (CEA). An abdominoperineal excision was performed. No hepatic, peritoneal, or nodal involvement was found. The mass was 19 by 7 cm, with fringes 8-9 mm long, and it encroached on the rectal bulb. The patient's condition improved dramatically and has remained satisfactory for 2 yr. The epithelium of the villosities resembled normal rectal mucosa. The interstitial tissue showed only moderate lymphoplasmocytic infiltration. Cell atypia occurred at the anal margin with nuclear stratification and numerous mitoses. Ultrastructurally, the Golgi bodies and endoplasmic reticulum were well-developed and the nuclei were active in the otherwise unexceptional surface epithelial cells. Plasmocyte IgA was detected on the tumor fringes. IgM and IgG were negative. The large amount of mucus was attributed to the great surface area of the tumor rather than to cell dysfunction.

8796 COLITIS PROXIMAL TO OBSTRUCTING COLONIC CARCINOMA. (Eng.) Tietjen, G. W.; Markowitz, A. M. (Columbia Univ., Coll. Physicians and Surgeons, 622 West 168th St., New York, NY 10032). *Arch. Surg.* 110(9):1133-1138; 1975.

The cases of five patients with nonspecific colitis proximal to an obstructing colonic carcinoma are presented. The first patient, a 75-yr-old diabetic man, had a carcinoma involving the entire wall of the descending colon, which was discovered at laparotomy following a 10-month history of lower abdominal pain and constipation. In the first 9 cm from the proximal margin, the mucosa exhibited an exudative colitis; a resection of the sigmoid colon was performed with a primary anastomosis. The patient made an uneventful recovery, but died 3.5 yr later due to metastatic disease. The second patient, a 72-yr-old man, presented with acute abdominal pain. An obstructing carcinoma of the midsigmoid colon, involving the serosal surface, was found. The mucosal surface of the proximal bowel was covered with a gray exudative pseudomembrane with several thickened inflammatory nodules. A left-sided colectomy with colocolostomy was performed; the patient recovered uneventfully, but died 2 yr later of metastatic disease. The third patient was a 36-yr-old woman with a 6-week history of abdominal pain, nausea, vomiting, and constipation. A completely obstructing sigmoid carcinoma was found, in addition to three proximal irregular ulcers (2 of which were perforated) and transmural inflammation of the colonic wall. The patient shows no further evidence of carcinoma after undergoing transverse and sigmoid colostomies. Abdominoperineal resection was performed in the fourth patient, a 59-yr-old woman, for a large fungating rectal carcinoma with 80% constriction of the lumen. She had presented with diarrhea and bloody stools. At 18 cm from the anal verge, there was a fibrous constriction showing fibrosis and infiltration of the submucosa and lamina propria, with lymphocytes and plasma cells. The patient died 16 months later of metastatic disease. The last patient, a 74-yr-old diabetic woman, presented with abdominal pain, vomiting, bloody diarrhea, and peritoneal signs in the lower abdomen. A constricting rectosigmoid carcinoma and a proximal segment of acute necrotizing colitis with early perforation were found; the carcinoma and colitis were separated by a zone of normal tissue. If colitis is present in the gross specimen, a more extensive resection is suggested. Consideration should be given to exteriorization of the colonic limbs or anastomosis with a proximal diverting colostomy.

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ING APPENDECTOMY. (Fin.) Myllarniemi,
H.; Perttala, Y.; Peltokallio, P. (HYKS:n kirurg
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OF LARGE BOWEL CANCER. (Eng.) Reddy,
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land, M. M. (M. D. Anderson Hosp. and Tumor Inst
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INVESTIGATIONS OF THE RELATIONSHIPS BE
TWEEN INTESTINAL FLORA, DIET, AND COLON CANCER.
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1514 Jefferson Highway, New Orleans, LA 70121).
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8825 HIRSCHSPRUNG'S DISEASE. EXPERIENCE OF THE ROUEN CHILD'S SURGERY UNIT. REPORT OF 37 CASES. (Fre.) Borde, J.; Mitrofanoff, P.; Wallon, P.; Lefort, J.; Leturgie, C. (C.H.R., Hopital Charles-Nicolle, boulevard Gambetta, 76000 Rouen, France). *Ann. Chir.* 30(3):257-262; 1976.

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8835 VOLVULUS OF THE COLON. (Eng.) Kronborg, O.; Lauritsen, K. (Bispebjerg Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 141:550-553; 1975.

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8837 WOUND INFECTION IN COLONIC SURGERY. (Eng Fikri, E.; McAdams, A. J. (Western Pennsy vania Hosp., 4800 Friendship Ave., Pittsburgh, PA 15224). *Ann. Surg.* 182(6):724-726; 1975.

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See also, 8628, 8630, 8649, 8650, 8652, 8653, 8654, 8656, 8658, 8663, 8679, 8711, 8721, 8755, 8756, 8759, 8767, 8771, 8774, 8860, 9094, 9099, 9103, 9117, 9125, 9158, 9181, 9186.

LARGE INTESTINE

Ulcerative Colitis

8839 RESPONSES TO DRUG THERAPY IN ULCERATIVE COLITIS: EVALUATION BY RECTAL BIOPSY AND HISTOPATHOLOGICAL CHANGES. (Eng.) Korelitz, B. I.; Sommers, S. C. (Lenox Hill Hosp., 100 East 77th St., New York, NY 10021). *Am. J. Gastroenterol.* 64(5):365-370; 1975.

The healing process of the large intestinal mucosa in ulcerative colitis was studied using rectal biopsy material from 363 cases of noninfectious inflammatory bowel disease and 50 controls. Histological changes were studied as the mucosa responded to drug therapy, with salicylazosulfapyridine, prednisone, 6-mercaptopurine and combinations of these agents. There was no statistically significant difference in the histologic alterations of 43 sigmoidoscopically positive untreated ulcerative colitis cases when compared to 115 sigmoidoscopically positive treated ulcerative colitis cases. Significantly fewer crypt abscesses ($p<0.025$) and more mucosal edemas ($p<0.001$) were found in the 55 patients with negative sigmoidoscopy after thera py than compared to the 115 sigmoidoscopy-positive patients. Drug combinations offered no identifiabl different histologic alterations, either when compared to each other or to each drug used alone. However, the overall histologic changes were signif cantly fewer after salicylazosulfapyridine than after either prednisone or 6-mercaptopurine therapy The results confirm that clinical remission in ulce ative colitis is not necessarily accompanied by resolution of the inflammatory process. Histopatholo gy of rectal biopsies is not significant for compar ing the responses of ulcerative colitis to individual drug therapy.

8840 LICHEN PLANUS AND ULCERATIVE COLITIS. (Eng.) Wyatt, E. H. (Dept. Dermatology, Hull Royal Infirmary, Hull HU3 2JZ, England). *Br. J. Dermatol.* 93(4):465-468; 1975.

cases of three patients with ulcerative colitis
an eruption resembling classical lichen planus
presented. The first patient, a 36-yr-old man,
plained of diarrhea and patchy nonpruritic rash.
moidoscopy showed pus, contact bleeding, and a
iable vascular pattern. Ulcerative colitis was
onstrated in the distal transverse colon by radio-
phy. The hemoglobin was 11.9%, and the WBC count
6,600, with toxic granulation in the polymorphs.
serum mucoprotein was 354 mg/ml. Despite treat-
t with salicylazosulfapyridine, methyl cellulose,
prednisolone enemas, the eruption increased.
ermatological examination revealed multiple
ple polygonal papules with Wickham's striae.
l lesions of lichen planus were seen. A good
ponse was obtained with a topical fluocinolone
tonide cream (0.2%). Case 2, a 45-yr-old man,
eloped a blistering, itchy eruption on the extrem-
es, followed by diarrhea with blood, mucus, and
ominal pain. Sigmoidoscopy showed a granular
friable mucosa with chronic inflammatory cells
the lamina propria. The serum mucoprotein was
mg/ml. Although he responded to treatment with
dnisolone enemas and methyl cellulose, he had
ermittent diarrhea and developed widespread lichen
nus of the limbs and trunk. The skin histology
wed slight hyperkeratosis and epidermal hyper-
sia. The eruption settled after 1 yr of treat-
t with fluclorolone acetonide 0.025% cream.
e 3, a 51-yr-old woman, developed diarrhea, and
ium enema examination revealed a loss of haustra-
n. Serum mucoprotein was 177 mg/ml. Her symp-
s temporarily responded to treatment with systemic
roids and p.o. salicylazosulfapyridine. When
symptoms recurred, sigmoidoscopy revealed an
ormal red granular mucosa and ulcerative colitis.
rash gradually faded following 15 months of
atment with flucortolone acetonide 0.025% cream.
author rules out the possibility that the skin
ease in these patients is due to drug therapy.
ce both rash and ulcerative colitis are character-
d by low epithelial cell turnover and increased
l death followed by cell infiltration at the
ement membrane, the skin and gut changes in
se patients could have a causal rather than a
tuitous relationship.

1 THE ALTERNATE COMPLEMENT PATHWAY IN INFLAM-
MATORY BOWEL DISEASE. QUANTITATION OF THE
PROACTIVATOR (FACTOR B) PROTEIN. (Eng.) Fein-
ein, P. A.; Kaplan, S. R.; Thayer, W. R. (Dept.
icine, Brown Univ., Providence, RI). *Gastroente-
ogy* 70(2):181-185; 1976.

C3 proactivator (C3PA) protein, a component of
alternate complement pathway, was measured in
normal volunteers and compared with the C3PA
ers of 14 patients with Crohn's disease (CD), 26
h ulcerative colitis (UC), and 5 with UC treated
surgery. The normal value was 74% (range, 43-108%),
le the UC patients had a mean of 95% (range, 69-
%) and the CD patients had a mean of 119% (range,
-183%). The differences in mean values were high-
significant ($p<0.001$) when patient groups were
pared with normal subjects or with each other.
en the C3PA titer of CD patients who were doing well or were stable was compared with that of CD patients experiencing an exacerbation, the latter was significantly higher ($p<0.01$). Values for treated CD patients were not significantly different from those for nontreated patients, nor were there significant differences related to type of treatment (salicylazosulfapyridine or steroids). The differences between C3PA titers in UC patients considered stable and in those experiencing exacerbation were significantly different from the normal titer ($p<0.01$ and 0.001, resp.), but not significantly different from each other. Treated and nontreated UC patients did not have significantly different titers of C3PA, nor did the mode of treatment result in any significant differences. The results demonstrate that the disturbance in C3PA metabolism is different for both CD and UC. There is a general derangement in complement metabolism in UC reflected in the abnormal $C'H_{50}$. This general derangement parallels similar abnormalities in the component parts of both the classical (C3, C4) and alternate (C3PA) pathways in CD and UC. In addition, there is a difference in complement metabolism in both classical and alternate pathway components between UC and CD patients in remission.

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8845 IMMUNOPATHOLOGY OF ULCERATIVE COLITIS AND CROHN'S DISEASE. (Ger.) Blaker, F. (Universitats-Kinderklinik, D-2000 Hamburg 20, Martinistr. 20, W. Germany). *Leber Magen Darm* 5(4):167-171; 1975.

8846 AGE-RELATED MICROSCOPIC OBSERVATIONS IN ULCERATIVE COLITIS. (Ger.) Otto, H. F.; Gebbers, J.-O. (Pathologisches Institut der Universitat Hamburg, Hamburg, W. Germany). *Verh. Dtsch. Ges. Pathol.* 59:438-443; 1975.

See also, 8630, 9079, 9095, 9178, 9179, 9184, 9185.

LIBRARY U. OF I. [illegible]

8847 ANGIOGRAPHY IN ACUTE PANCREATIC TRANSECTION. (Eng.) Soroudi, M.; Bookstein, J. J. (Univ. Michigan Medical Center, Ann Arbor, MI 48104). *Radiology* 115(2):309-311; 1975.

The angiographic features in two cases of acute traumatic transection of the pancreas are reported. A 12-yr-old girl was hospitalized with left upper quadrant pain after being kicked by a horse. Laboratory tests revealed high serum amylase, and a peritoneal tap was trace-positive for blood. Celiac and selective splenic artery injection with a contrast medium revealed multiple small areas of extravasation from the intrasplenic arterial branches. The parenchymal phase revealed some mottling of the spleen with suggestion of an avulsed fragment. There was early filling of the splenic vein, without evidence of displacement or compression. A diagnosis of splenic rupture was made. Laparotomy revealed subcapsular hematoma of the spleen, avulsion of short gastric arteries, complete transection of the distal fourth of the pancreas, and a hematoma involving the tail of the pancreas. Splenectomy and distal pancreatectomy were performed. A 19-yr-old man developed profound weakness, anorexia, weight loss, and ascites after suffering trauma to the back and right flank in an automobile accident. The serum amylase and serum lipase were elevated, the hemoglobin was 10.5 g/100 ml, and an abdominal tap revealed fluid with a high amylase concentration. A celiac and superior mesenteric arteriogram revealed normal pancreatic vessels, with displacement of the superior mesenteric artery to the left; an intrahepatic hematoma was also demonstrated. Surgery revealed a huge pseudocyst of the lesser sac, a larger hepatic hematoma, a fracture of the pancreas at the junction of the body and the head, and complete transection. In both cases, a lack of correlation between the angiographic and operative findings was evident. A possible explanation lies in the apparent fragility of the pancreas, so that transection may occur with little or no intra- or extra-pancreatic hemorrhage. The fact that the normal pancreas stains relatively faintly on angiography also impairs recognition of transection.

8848 RETROGRADE PANCREATIC VENOGRAPHY. AN EXPERIMENTAL STUDY. (Eng.) Rosch, J.; Dotter, C. T. (Univ. Oregon Medical Sch., 3181 S.W. Sam Jackson Park Road, Portland OR 97201). *Radiology* 114(2):275-279; 1975.

The feasibility of retrograde pancreatic venography was explored in 10 anesthetized mongrel dogs using transjugular, transhepatic portal access and a coaxial technique for selective pancreatic vein catheterization. Selective venograms were obtained with 2-sec manual injections of contrast medium (76% Renografin, 0.5-15.0 ml); serial filling was done at two exposures per sec during the injection, with four films at 1-sec intervals thereafter. A detailed autopsy evaluation of the pancreas was then performed. Optimal filling of the catheterized vessel and its branches and sometimes, even anastomoses to other pancreatic vessels were obtained with a deep but unwedged positioning of the catheter tip in the pancreatic vein and an adequate amount of contrast medium. With lesser amounts of contrast medium or with the catheter tip near the venous ostium, the catheterized vein alone was filled incompletely. Larger injections sometimes resulted in a partial penetration of contrast medium into the parenchyma and large injections into small vessels and wedged injections caused an extensive penetration of contrast material into the parenchyma. Wedged injection into a left pancreatic vein caused dense infi tration to much of the left pancreatic lobe, wedge injection into a branch of the pancreaticoduodenal vein infiltrated only a small part of the right pancreatic lobe, and wedged injection into a media venous arcade resulted in diffuse filling of the distal portion of the right pancreas. At autopsy, no changes were found in the areas of the pancreas where only free venography was done, and there was little or no pancreatic parenchymal filling. However, swelling, loss of lobular structure, and foc to-diffuse parenchymal hemorrhages were found in areas of the pancreatic parenchyma infiltrated by contrast agent. Selective catheterization and retrograde pancreatic venography by the transjugular approach may offer improved pancreatic diagnosis when the safety of this method is further demonstrated.

8849 HEMORRHAGE FROM THE PANCREATIC DUCT. STUDY OF SIX PERSONAL CASES AND LITERATURE REVIEW. (Fre.) Vankemmel, M.; Paris, J. C.; L'Hermine, C.; Houcke, M. (Cite Hospitaliere, 5900 Lille, France). *Med. Chir. Dig.* 5(2):83-91; 1976.

Hemorrhage from Wirsung's duct into the gastrointestinal tract is reported in six patients. A 69-yr-old man presented with a 6-month history of epigastric pain, melena, and hematemesis. Celiac-mesente ic arteriography found a small calcified aneurysm i the splenic artery. Examination of the pancreas after splenopancreatectomy also showed a vascular calcification in the Wirsung duct. The diagnosis was wirsungorrhagy (WGR) secondary to a pancreatic lesion of arterial origin. WGR by arterial erosion during pancreatopathy was exemplified in five patients. A 48-yr-old man with chronic pancreatiti (CP) for 10-yr duration presented with epigastric pain, vomiting, melena, and anemia. Laparotomy found the head of the pancreas hypertrophied, corresponding to a hemorrhagic pseudocyst communicating with Wirsung's duct. Surgery in a 36-yr-old man with a history of CP and recent icterus, anemia and melena found a cholestatic liver, denuded gastr duodenal artery, distended gallbladder, and massive cystic necrosis of the pancreatic head and body encroaching on the pancreatic duct. Similar symptoms occurred in a 43-yr-old man with a massive retroperitoneal hemorrhagic focus occupying the entire bed of the pancreatic head and tail due to erosion of the splenic artery. A 30-yr-old man with nearly identical symptomatology was found to have eroded branches of the superior mesenteric and gastroduodenal arteries. A 68-yr-old coronary patient had a massive tumefaction of the pancreatic head, whose inferior segment was a necrotic thrombus communicating with the pancreatic ducts. The

esence of a communication or lesion between Wir-
ng's duct and the gastrointestinal system should
ggest therapy with a dual-aim: stoppage of hemor-
age and eradication of the primary arterial or
ncreatic cause.

50 EXPERIMENTAL RETROGRADE DRAINAGE OF THE PANCREAS. (Rus.) Koval'skii, M. P. (Kiev
edical Inst., Kiev, USSR). *Klin. Khir.* (9):71-73;
75.

51 PANCREATIC VEINS. (Fre.) Sow, M.-L.; Dintimille, H.; Sylla, S.; Balde, I.;
rgenson, Cl. (Laboratoire d'Anatomie de la Faculte
xte de Medecine et de Pharmacie, Dakar, Senegal).
ll. Soc. Med. Afr. Noire Lang. Fr. 20(2):123-128;
75.

52 SYMPTOMATOLOGY OF ANNULAR PANCREAS IN THE ADULT. (Fre.) Hureau, J.; Bourdais, J.
.; Debbasch, L.; Delavierre, Ph.; Vayre, P.;
ux, M. (Hopital de Vaugirard, 389, rue de Vaugir-
d, 75015 Paris, France). *Sem. Hop. Paris* 51(45):
43-2746; 1975.

53 CYTOLOGICAL DIAGNOSIS OF PANCREATIC CANCER. (Fre.) Cabre-Fiol, V.; Vilardell, F.
cole Universitaire, Hospital de la Santa Cruz y
n Pablo, Barcelona-13, Spain). *Med. Chir. Dig.*
5/6):277-281; 1975.

54 EFFECTS OF SECRETIN ON PANCREATIC AND RENAL FUNCTION IN CYSTIC FIBROSIS OF THE
NCREAS [Abstract]. (Eng.) Hadorn, B.; Hottinger,
; Biland, F.; Oetliker, O.; Schneider, A.; Bretscher, D. (Dept. Pediatrics, Univ. Berne, Berne, Switzerland). *Biol. Gastroenterol. (Paris)* 8(4): 347; 1975.

8855 PANCREATIC ISCHAEMIA: SENSITIVITY AND REVERSIBILITY OF THE CHANGES. (Eng.) Slater, D. N.; Bardsley, D.; Mangnall, Y.; Smythe, A.; Fox, M. (Royal Hosp., Sheffield, England). *Br. J. Exp. Pathol.* 56(6):530-536; 1975.

8856 FAT NECROSIS. A CAUSE OF PANCREATIC PARENCHYMAL NECROSIS [Abstract]? (Eng.) Schmidt, H.; Lankisch, P. G. (Medizinische Universitatsklinik, Gottingen, W. Germany). *Biol. Gastroenterol. (Paris)* 8(4):351-352; 1975.

8857 EFFECT OF DIFFERENT TYPES OF ANESTHESIA AND SURGICAL TRAUMA ON PANCREATIC FUNCTION. (Rus.) Rusakov, V. I.; Parsieva, A. I. (Surgical Clinic, Rostov Medical Inst., Rostov, USSR). *Khirurgiia* (10):92-97; 1975.

See also, 8427, 8640, 8646, 8673, 8674, 8771, 8862, 8868, 8931, 9052, 9056, 9071, 9073, 9117.

PANCREAS

Pancreatitis

58 ULTRASTRUCTURAL STUDIES OF HUMAN ACUTE PANCREATITIS. (Eng.) Taura, S.; Tsunoda,
.; Yoshino, R.; Harada, N.; Akashi, M.; Ito, T.;
uchiya, R. (Nagasaki Univ. Sch. Medicine, 7-1
akamoto-machi, Nagasaki, 852 Japan). *Gastroen-*
erol. Jpn. 10(2):132-140; 1975.

lectron microscopy was used to examine biopsied
ancreatic tissue from a 32-yr-old woman with acute
emorrhagic necrotizing pancreatitis and to compare
ese findings with those from experimental acute
ancreatitis. Pancreatic acinar units were de-
troyed. The acinar lumen was dilated with filling
f fibrillar materials, occasionally containing de-
enerated cellular components or neutrophils. Fi-
rillar material accumulated at the periphery in
e acinar cells. In some acinar cells, this ac-
mulation occupied the entire cell and was accom-
anied by the disappearance of the luminal margin and the mixing of intracellular fibrillar materials with acinar lumen contents. The basal lamina of these acinar units was almost intact. These findings suggest that the lumen contents may penetrate into the acinar cells through the disruption of the luminal margin. This penetration may be one of the factors in the pathogenesis of human acute pancreatitis. The findings in this case differ somewhat from those obtained in studies of experimental acute pancreatitis in that the deposition of fibrillar materials was limited within acinar cells and the site of penetration of luminal content was found at the luminal margin of acinar cells.

8859 ESTIMATION OF PLASMA ESTEROLYTIC ACTIVITY AND ITS IN VITRO INHIBITION BY PROTEINASE INHIBITORS DURING ACUTE PANCREATITIS IN THE HUMAN. (Eng.) Worthington, K. J.; Cuschieri, A. (Dept.

Surgery, Liverpool Univ., P.O. Box 147, Liverpool L69 3BX, England). *Br. J. Exp. Pathol.* 57(2):165-169; 1976.

The plasma esterolytic activity was measured using benzoyl arginine ethyl ester (BAEe) in the peripheral venous blood of 12 patients with acute pancreatitis, 7 normal healthy volunteers, and a contrast group of 10 patients with acute intraabdominal inflammations other than acute pancreatitis. The plasma esterolytic activity was significantly elevated in the pancreatitis group (mean activity= 925 mU/100 ml), in comparison with the activities in controls (275 mU/100 ml, $p<0.01$) and the contrast group (385 mU/100 ml, $p=0.98$). This activity was maximal during the first 48 hr of the illness and remained elevated for a further 8 days thereafter. Aprotinin (2,000 K.I. U/0.3 ml plasma) did not completely inhibit this esterolytic activity (mean inhibition, 82 ± 24%), although it resulted in a more substantial inhibition than either ovomucoid (2 mg; mean inhibition, 34 ± 28%) or soybean inhibitor (2 mg; 51 ± 29%). It is concluded that pancreatic enzymes are released into the circulation during acute pancreatitis and that aprotinin does not completely inhibit this proteolytic activity. This polyvalent proteinase inhibitor should be administered in much higher dosage than that used formerly in acute pancreatitis. The plasma esterolytic activity appears to be of diagnostic value in acute pancreatitis.

8860 COLONIC LESIONS DURING NECROTIZING PANCREATITIS. REPORT OF FOUR CASES.

(Fre.) Leborgne, J.; Pannier, M.; Le Neel, J.-C.; Potiron, L.; Visset, J. (Clinique Chirurgicale A, C.H.U., Hotel-Dieu, place Alexis-Ricordeau, 44035 Nantes Cedex, France). *Ann. Chir.* 30(5):377-383; 1976.

The case reports of one patient with colonic necrosis and three with colonic fistulas secondary to acute pancreatitis are reviewed. A 39-yr-old woman with a history of renal transplantation suddenly developed severe abdominal pain, significant diarrhea, and abdominal distension. An unusually large amount of gas was found in the posterior epiploic region due to colonic perforation at the level of the transverse colon. Necrotizing pancreatitis was found on the body and tail of the organ. A colectomy from the ascending to the sigmoid colon, cholecystostomy, and a splenopancreatic ablation were performed. The patient died postoperatively. At autopsy, steatonecrotic lesions of pancreatic origin were found in the intestinal submucosa and subserosa. In the three patients with hemorrhagic, lithiasic, and pseudocytic necrotizing pancreatitis, postoperative fistulation complicating simple drainage of the pancreatic bed was found. Two of the patients died from hemorrhage and infection. One patient was considered cured after transverse colectomy extending to the angle of the descending colon, pancreatic sequestrectomy, and cholecystectomy. Colonic necroses are ischemic in origin and arise simultaneously with pancreatic lesions. Colonic perforation is secondary and appears as an internal or external fistulation, a deep suppuration, or acute peritonitis.

8861 SEPTIC COMPLICATIONS OF PANCREATITIS.

(Eng.) Grace, S. G.; State, D. (Harbor General Hosp., Torrance, CA). *Br. J. Surg.* 63(3): 229-232; 1976.

The clinical picture, therapy, and prognosis of 20 patients with pancreatic and peripancreatic abscesse are reported, and a case report of a patient with secondary abscess is presented. Nine patients presented with primary pancreatic lesser sac abscesses and 11 with secondary abscesses; 7 patients with primary and 8 or 9 patients with secondary abscesses were alcoholics. Among the patients with primary pancreatic abscesses, the most common presenting complaint was epigastric and upper abdominal pain, occurring in all but two patients. Five patients had abnormal chest films with infiltrates and atelectasis; one patient had a left pleural effusion. Eight patients were explored surgically; the correct diagnosis was suspected preoperatively in only three cases. All patients were treated with nasogastric suction, parenteral fluids, and antibiotics. The abscesses were drained, and Chaffin tubes and/or Penrose drains were left *in situ*. Six patients who underwent surgery had prolonged fever or septicemia. All but one patient with advanced cirrhosis and progressive bronchopneumonia, who was treated conservatively, survived; the average hospital stay was 37 days. Of 11 patients with pancreatic or peripancreatic abscesses that occurred following surgery, 4 had been hospitalized for acute pancreatitis and 3 had a history suggestive of gallbladder disease. Nine patients developed fever and sepsis within 2 weeks of operation; the other two developed symptoms at 3 and 6 weeks after operation, resp. Six patients had a pleural effusion, demonstrated by chest x-ray, and ultrasound demonstrated cystic lesions or an abdominal mass in three patients tested. The diagnosis of abscess was made in all but one patient, who died after portacaval shunt; his symptoms had been thought to represent delirium tremens. All patients except the one in whom the diagnosis was missed were treated with broad spectrum antibiotics. Of nine patients who were surgically explored at an average of 20 days following the initial operative procedure, eight had pancreatic lesser sac abscess, and one had multiple intra-abdominal abscesses with a primary focus in the lesser sac. There were three deaths. Two of these patients had *Candida* in their blood cultures, and three patients had upper gastrointestinal bleeding. Five patients required second drainage procedures for residual pancreatic and peripancreatic loculations. The surviving patients were hospitalized an average of 92 days. The appropriate management for pancreatic abscess, whether primary or secondary, is early recognition and drainage, and it usually involves prolonged hospitalization. Broad spectrum antibiotics are helpful and should be used until blood cultures indicate a specific antibiotic therapy.

8862 ANGIOGRAPHIC SIGNS OF PANCREATIC LESIONS.

(Rus.) Prokubovskii, V. I.; Kudinov, A. A.; Gogodze, A. V. (S. I. Spasokukotskii Surgical Clinic, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Khirurgiia* (10):51-59; 1975.

363 PANCREATITIS IN CHILDREN. (Rus.) Astashkin, V. A. (Briansk Oblast Hosp. No. 1, riansk, USSR). *Khirurgiia* (10):14-18; 1975.

364 ALCOHOLIC EXPERIMENTAL PANCREATITIS IN DOG. PATHOLOGICAL STUDY [Abstract]. Eng.) Sahel, J.; Sarles, H.; Lebreuil, G.; Tiscor-la, O. M. (INSERM U-31, 46, chemin de la Gaye, F 009 Marseille, France). *Biol. Gastroenterol. aris)* 8(4):363; 1975.

865 CONTINUOUS PERITONEAL DIALYSIS IN THE TREATMENT OF ACUTE EXPERIMENTAL PANCREA-ITIS IN THE RAT [Abstract]. (Eng.) Lankisch, P. .; Koop, H.; Winckler, K.; Schmidt, H. (Dept. edicine, Univ. Gottingen, Gottingen, W. Germany). *iol. Gastroenterol. (Paris)* 8(4):351; 1975.

866 ETIOLOGIC FACTORS OF ACUTE PANCREATITIS IN OUR ENVIRONMENT. (Spa.) Delgado, B. Hosp. "Dr. Manuel Quintela," Montevideo, Uruguay). *ir. Urug.* 49(1):19-22; 1975.

867 THE POSSIBLE ROLE OF SERUM COMPLEMENT SYSTEM IN THE FORMAL PATHOGENESIS OF ACUTE ANCREATITIS: II. COBRA VENOM FACTOR PANCREATITIS—ODIUMTAUROCHOLATE AND DEOXYCHOLATE PANCREATITIS. Eng.) Seelig, R.; Seelig, H. P. (Inst. Immunology, niv. Heidelberg, Heidelberg, W. Germany). *Acta epatogastroenterol. (Stuttg.)* 22(5):335-346; 1975.

868 PANCREATIC ABSCESSES COMPLICATING ACUTE PANCREATITIS. (Rus.) Beliaev, A. A. 2nd Surgical Clinic, N. V. Sklifosovskii Scientific es. Inst. Emergency Aid, Moscow, USSR). *Khirurgiia* 10):10-14; 1975.

869 SOME ASPECTS OF CHRONIC RELAPSING PANCREATITIS IN BOHEMIA. (Eng.) Herfort, K.; artos, V.; Kotrlik, J. (Second Dept. Gastroenterol-gy, Charles Univ., Karlovo nam. 32, 121 11 Praha , Czechoslovakia). *Rev. Czech. Med.* 21(2):93-98; 975.

3870 NUTRITIONAL ASPECTS OF CHRONIC PANCREATITIS IN GERMANY [Abstract]. (Eng.) oebell, H.; Hotz, J. (Section Gastroenterology, Univ. Ulm, W. Germany). *Biol. Gastroenterol. (Paris)* 8(4):365; 1975.

8871 THE PRESENCE OF ASCITES IN CHRONIC PANCREATITIS. (Por.) Mott, C. de B.; Guarita, D. R.; Barros, M. I. B.; Conte, V. P.; Machado, M. C. C.; Bove, P.; Bettarello, A. (Hospital das Clinicas de Sao Paulo, Sao Paulo, Brazil). *Arq. Gastroenterol.* 12(4):245-249; 1975.

8872 CHRONIC SENILE SILENT PANCREATITIS [Abstract]. (Eng.) Ammann, R. W. (Gastroenterology, Univ. Zurich, Zurich, Switzerland). *Biol. Gastroenterol. (Paris)* 8(4):365; 1975.

8873 LEVELS OF ALCOHOL CONSUMPTION IN CHRONIC CALCIFYING PANCREATITIS [Abstract]. (Eng.) Cros, R. C.; Nicolas, R.; Sarles, H. (INSERM U-31, 46, chemin de la Gaye, F 13009 Marseille, France). *Biol. Gastroenterol. (Paris)* 8(4):364; 1975.

8874 A CASE OF CHRONIC PANCREATITIS WITH LACTESCENT PLASMA. (Eng.) Yoshida, M.; Nagai, S.; Tonouchi, S.; Murakami, T. (Masaru Yoshida Tokyo Medical, Dental Univ., Sch. Medicine, 1-5-45, Yushima Bunkyo 113, Tokyo, Japan). *Gastroenterol. Jpn.* 9(4): 421-426; 1974.

8875 NORMAL SERUM AMYLASE IN HYPERLIPEMIC PANCREATITIS: STUDIES OF POSSIBLE ETIOLOGY [Abstract]. (Eng.) Mishkin, S.; Bates, J.; O'Hashi, J.; Schneider, P.; Sniderman, A. (Royal Victoria Hosp., Montreal, P.Q., Canada). *Digestion* 13(3): 181-182; 1975.

See also, 8428, 8509, 8606, 9056, 9070.

LIVER AND BILIARY TRACT

3876 THE ENTEROHEPATIC CIRCULATION OF BILE ACIDS IN MAN. (Eng.) Hofmann, A. P. (Mayo Clinic and Mayo Foundation, Rochester, MN). *Adv. Intern. Med.* 21:501-534; 1976.

The anatomy and physiology of the biliary circulation are reviewed. The chemistry, shared physical versus specific physiologic actions, bacterial interactions, history, physical biotransformations, portal transport, and hepatic uptake of bile acids are discussed; methods for detecting altered bile acid metabolism and disturbances of the enterohepatic circulation of bile acids are also described. In addition, the enterohepatic circulation under the steady state is characterized in detail with regard to the steroid and amino acid moieties. In man, two primary bile acids, cholic and chenodeoxycholic acids, are formed in the liver from cholesterol; the carboxyl group of these bile acids is conjugated in amide linkage with the amino group of glycine or taurine to form four conjugated primary bile acids, cholylglycine, cholyltaurine, chenylglycine, and chenyltaurine. During enterohepatic cycling, the steroid moiety of the primary bile acids is altered; the most important change is 7 α-dehydroxylation, which results in the formation of deoxycholic acid from cholic acid and lithocholic acid from chenic acid. These secondary bile acids are absorbed in part, conjugated in the liver with glycine and taurine, and excreted in bile. All major biliary bile acids can form mixed micelles with polar lipid molecules, which explains the two specific functions of bile acids: to repress cholesterol and bile acid synthesis in the liver and to inhibit sodium absorption in the small and large intestines. In the past few years, certain aspects of the negative feedback regulation of bile acid synthesis by bile acids have been clarified in man. The administration of chenodeoxycholic acid suppresses cholic acid synthesis by about 50%, and the administration of cholic acid also suppresses chenodeoxycholic acid synthesis by about 50%. Bile acids regulate cholesterol syntheis by inhibiting the HMG-CoA reductase or its sis by inhibiting the HMG-CoA reductase or its this process than cholic acid. The idea is emerging that the quality, as well as the quantity, of bile acids passing through the hepatocyte influences cholesterol and possibly, bile acid synthesis. There has been a spectacular increase in the understanding of biliary circulation during the past 5 yr. The mechanism of cell transport of bile acids, the regulation of their synthesis, and the action of bile acids in bile formation are still unknown.

8877 THE INTERMICELLAR BILE SALT CONCENTRATION IN EQUILIBRIUM WITH THE MIXED-MICELLES OF HUMAN BILE.

(Eng.) Duane, W. C. (Veterans Admin. Hosp., 54th St. and 48th Ave. South, Minneapolis, MN 55417). *Biochim. Biophys. Acta* 398(2):275-286; 1975.

The intermicellar bile salt concentration (IMBC) existing in equilibrium with the bile salt-lecithin-cholesterol mixed micelle was studied in human gallbladder bile obtained at cholecystectomy. Equilibrium dialysis was used to measure the IMBC as a function of ionic strength, dilution, and bile salt content of the mixed micelle. The method was validated using data on the cholate-lecithin mixed micelle. Determinations were also made of the bile salt, phospholipid, cholesterol, bile water, chloride, dialyzate protein, and conjugated bile salt concentrations, and the dialysis was repeated using an artificial bile system prepared from pure conjugated bile salts, egg lecithin, and cholesterol. The IMBC of the bile was essentially independent of ionic strength in the range 0.05-0.15 M chloride. Simple dilution of the bile lowered the IMBC, about two-thirds for each twofold dilution, due to a simultaneous decrease in the molar ratio of bile salt:phospholipid in the micelle. Dilution of the micelles with a constant micellar bile salt:phospholipid ratio did not affect the IMBC. There was a linear relation between IMBC and the micellar bile salt:phospholipid ratio, as defined in the dilution studies, in the study range. For a composite of five bile samples, this relation was described by the equation: IMBC=1.27 (bile salt:phospholipid) + 0.538. Data obtained with the artificial bile agreed closely with those obtained with human bile, suggesting that the other constituents of bile did not affect this analysis. These findings may be helpful in understanding micellar cholesterol solubilization in bile.

8878 ANTIGLOBULIN FACTOR IN SERA FROM PATIENTS WITH LIVER DISEASE.

(Eng.) Yasuda, J.; Arai, K. (Natl. Inst. Health, Shinagawa-ku, Tokyo 141, Japan). *Jpn. J. Med. Sci. Biol.* 29(1):1-9; 1976.

An antiglobulin factor, non-neutralizable by human γ-globulin, was demonstrated in the sera of two patients with liver disease. By absorption and elutio techniques, two fractions were differentiated in a serum: one was reactive to rabbit antibody, and the other seemed to be cross-reactive to rabbit and human antibodies. In a double immunodiffusion test, the antiglobulin factor formed a precipitation band with heat-aggregated human immunoglobulin G (IgG), a did rheumatoid arthritis serum. Although the antiglobulin activity to rabbit antibody was demonstrated in both the IgM and IgG fractions, the reactivity to human antibody was localized in the IgM fraction. From its selective reactivity to individual anti-D sera (sensitizers), at least a part of the specificity of the antiglobulin factor must be related to anti-Gm (1), and can be regarded as autoreactive.

8879 CLINICAL SIGNIFICANCE OF SERUM GLUTATHIONE REDUCTASE IN VARIOUS CLINICAL CONDITIONS, ESPECIALLY IN LIVER DISEASES.

(Eng.) Wakui, K.; Kumata, H.; Tadaki, H.; Yamagata, S. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 118(1):17-23; 1976.

Serum glutathione reductase (SGR) activity was measured in various conditions, including acute hepatitis (110 patients), chronic hepatitis (117), liver cirrhosis (47), malignant neoplastic diseases (30), obstructive jaundice (9), and liver cancer (13) to determine its clinical significance. In 42 normal persons, the mean SGR was 21.1 ± 5.8 U/ml. Statistically significant elevations (at the 1% level) in enzyme activity occurred in all conditions; the levels in acute hepatitis, chronic hepatitis, liver cirrhosis, and cholelithiasis were 77.1± 27.6, 37.3 ± 12.4, 43.9 ± 22.0, and 62.0 ± 26.0 U/ml, resp. The mean SGR levels in 10 patients with gastric cancer, 5 with primary liver cancer, 8 with metastatic liver cancer, 4 with pancreatic cancer, and 3 with cancer of the choledochus were 36.5 ±

11.2, 74.4 ± 40.4, 107.5 ± 40.4, 105.0 ± 37.1, and 150.1 ± 34.3 U/ml, resp. In the patients with acute hepatitis, the elevations in SGR correlated significantly with elevations in SGOT ($p<0.01$), SGPT ($p<0.01$), and alkaline phosphatase ($p<0.01$). In chronic hepatitis, no significant correlations were found between SGR activity and the three parameters of liver function. In patients with liver cirrhosis, there was a statistically significant correlation between the elevation in SGR and alkaline phosphatase ($p<0.01$). It is concluded that the determination of SGR is of limited clinical value.

8880 A DUAL RADIONUCLIDE LIVER SCINTIGRAPHY AND ALPHA FETO PROTEIN EXAMINATION APPROACH IN DIAGNOSIS OF HEPATIC DISEASES.

(Eng.) Felizardo, F. O.; Yamasaki, T.; Kusakabe, K.; Tazaki, E.; Miyamae, T.; Miyakawa, T. (Rizal Provincial Hosp., Pasig, Rizal, Philippines). *J. Philipp. Med. Assoc.* 51(1/2):31-37; 1975.

The results of ^{198}Au colloid liver scans in 24 patients were compared with those of ^{67}Ga citrate scans in 49 patients, and the value of scanning in combination with the determination of alpha-fetoprotein in the diagnosis of various hepatic diseases was studied. Each patient received 200-400 μCi ^{198}Au colloid or 1-2 mCi Ga citrate. Seventeen of the 24 ^{198}Au colloid scans revealed a filling defect, and other 5 scans showed a questionable distribution of radioactivity. In 38 of the 49 ^{67}Ga citrate scans, a filling defect was found, and a further 6 scans showed questionable uptake. When the 24 patients who received the ^{198}Au colloid were also subjected to ^{67}Ga citrate scanning, two showed a scan in which the ^{67}Ga citrate distribution in the filling defect found in the ^{198}Au colloid scan was more than that in the surrounding normal liver tissue. Seven additional scans showed that the ^{67}Ga distribution in the ^{198}Au filling defect was the same as in the surrounding normal liver tissue, seven scans were questionable, and eight scans were negative.

8881 SALYCYLAMIDE GLUCURONIDE FORMATION IN LIVER DISEASE AND ITS CHANGE BY DRUGS.

(Eng.) Adachi, Y.; Wakisaka, G.; Yamamoto, T. (Kinki Univ. Sch. Medicine, Osaka 589, Japan). *Gastroenterol. Jpn.* 10(2):120-131; 1975.

The *in vivo* metabolism of salicylamide glucuronide (SAMG) in 0-6-, 6-12-, and 0-12-hr urine samples was measured after oral administration of salicylamide (maximal glucuronide formation was obtained with 1.0 mg salicylamide), in 7 normal subjects, in 51 patients with various liver diseases, and in 19 patients after drug therapy (bucolome, phenobarbital, rifampicin, and phenytoin). The percent of SAMG recovered from the 0-6-, 6-12-, and 0-12-hr urine samples was 71.3 ± 8.3, 33.0 ± 10.0, and 68.4 ± 7.9, resp., in normal volunteers, with 0-0.08% of the total salicylamide appearing as free salicylamide in the 0-12-hr urine sample. Patients with acute hepatitis excreted most of the salicylamide within 6 hr, indicating rapid drug processing. In patients with acute hepatitis, chronic hepatitis, and liver cirrhosis, the percent of SAMG in the 0-6- and 0-12-hr urine samples was 57.2 ± 8.6 and 53.4 ± 8.7 (a slight, but significant decrease), 66.6 ± 10.9 and 63.9 ± 10.7, and 48.6 ± 10.7 and 46.0 ± 10.2, resp. Free salicylamide increased slightly in cases of liver disease (acute hepatitis, 0-0.4% and chronic hepatitis, 0-0.6%). Serum bilirubin levels tended to be inversely correlated with the percent of SAMG. In three of five cases of Gilbert's syndrome, the percent of SAMG remained at a normal level. The percent of SAMG in cases with unconjugated hyperbilirubinemias of other geneses was almost within normal limits. Bucolome (900 mg, p.o.) and phenobarbital (100 mg, p.o.) increased the percent of SAMG in patients with various liver diseases. After rifampicin (450 mg, p.o.) or phenytoin administration, the percent of SAMG of the patients with lung tuberculosis or epilepsy did not surpass that of normal volunteers. Because the percent of SAMG was almost normal in slight unconjugated hyperbilirubinemias, bilirubin glucuronide formation is thought to be more vulnerable than drug glucuronide formation.

8882 TREATMENT OF ACUTE AND CHRONIC LIVER DISEASE AND SEVERAL MALABSORPTION SYNDROMES WITH MERCAPTOPROPIONYLGLYCINE, MPG (THIOLA).

(Ger.) Markoff, N. G. (Medizinische Klinik des Kantonsspitals, Loestrasse 135, CH-7000 Chur, Switzerland). *Praxis* 64(30):958-961; 1975.

Experiences in the management of acute and chronic liver disease with α-mercaptopropionylglycine (MPG) were compiled. MPG is absorbed rapidly by the gastrointestinal tract, with an equally rapid renal excretion. It is concentrated in the pancreas, liver, adrenals, and kidney. Up to 70% is found in RBC and up to 60% in the serum protein, 30 min postinjection. Liver deposits are mainly mitochondrial, and alcohol dehydrogenase activity is elevated. The immunoglobulin M level was significantly depressed, without demonstration of immunosuppression, in acute viral hepatitis patients after 15 days of MPG treatment. The transaminase levels were reduced, BSP retention and clearance were improved, and pretreatment biopsy was modified after daily doses of 2.5 g MPG in 80 patients with chronic persistent and chronic active hepatitis or compensated cirrhosis. Enzymatic normalization did not occur. In the long-term management of 50 patients with nonalcoholic chronic disease, side-effects did not appear, unlike D-penicillamine treatment; only slight differences over controls were established. MPG at doses of 1,000 mg/day, p.o., was without sequelae, but it had the same effect as 0.9 g/day of D-penicillamine in a 21-yr-old man with Wilson's disease. Urinary Cu rose from 370 to 420 μg/day and the urinary Cu reaction rose from 21 to 22 μg% in this patient. Combined MPG-penicillamine therapy had no effect on Cu metabolism in nine patients with Wilson's disease. Administration of MPG (5.5 g/day, i.v.) for 1-4 months led to complete normalization of the intestinal mucosa in several of 29 patients with malabsorption syndromes, including 10 with chronic active hepatitis.

8883 THE EFFECT OF RIFAMPICIN ON LIVER MORPHOLOGY IN TUBERCULOUS ALCOHOLICS. (Eng.)

Thompson, J. E. (New South Wales Health Commission, 86 George Street, Sydney, NSW, Australia). *Aust. N.Z. J. Med.* 6(2):111-116; 1976.

The livers of 79 tuberculous patients, including 36 alcoholics, who received rifampicin therapy, were examined to determine the relation of pre-existing changes in liver cell and lobule morphology to rifampicin therapy. Rifampicin (8 mg/kg/day) was administered in combination with isoniazid and another drug (either ethambutol or streptomycin). Six patients, five of whom were alcoholic, developed acute liver disease. Eleven patients had histological changes in their initial liver biopsies, ranging from fatty infiltration consistent with alcoholic liver disease to chronic active hepatitis. At 2 months, four patients showed histological changes not seen on initial biopsy, while fatty changes had either disappeared or greatly diminished in all patients in whom they were previously present. Some portal inflammation and patchy swelling of the liver cells were noted in three of the four, and an increase in severity of the changes of active chronic hepatitis occurred in the fourth. The fifth patient showed fatty changes on initial biopsy, accompanied by a slight rise in SGPT. At 1 month after initiation of treatment, he developed severe clinical liver disease and a deterioration of liver function tests. Patients with both normal pretreatment liver function tests and normal biopsies did not develop histological abnormalities. In one patient, chronic active hepatitis is believed to have followed irregularly taken rifampicin. It is suggested that alcoholics are particularly susceptible to idiosyncratic reactions of the liver, both clinical and subclinical, and that rifampicin is contraindicated in alcoholics with initial abnormal liver function tests.

8884 LIVER DISEASE IN DRUG ADDICTS: FREQUENCY EPIDEMIOLOGY AND SOCIAL IMPORTANCE. (Eng.)

Helmstaedt, D.; May, B. (Dept. Medicine, Medizinische Hochschule Hannover, D-3000 Hannover, Karl-Wiechert Allee 9, W. Germany). *Int. J. Clin. Pharmacol. Biopharm.* 12(1/2):46-49, 1975.

The incidence and epidemiology of liver disease among 257 drug addicts or persons in contact with drug addicts were evaluated. Of the 257 subjects, 189 had taken drugs i.v., 46 had taken drugs p.o., and 22 had taken no drugs, but had visited the addicts at a drug center. Thirty medical students served as controls. The bilirubin level was elevated in 15.1% of 35 addicts tested. Fifty-four percent of the 189 i.v. drug users had signs of liver disease. The frequency of similar pathological findings in the p.o. drug users was 10%; no hepatic abnormalities were seen in the controls. Viral etiology accounted for liver disease in 8.9% of the cases. Indications for chronic aggressive and persistent hepatitis were found in approximately 20% of the patients. The cases of liver disease in contact persons, as well as new infections within the therapeutic community, suggest that close contact with drug addicts favors the transmission of liver disease.

8885 OBLITERATIVE DISEASE OF LIVER VEINS: CLINICAL, DIAGNOSTIC, THERAPEUTIC AND PATHOGENETIC ASPECTS OF BUDD-CHIARI SYNDROME. (Ger.

Butzow, G. H.; Burkhardt, A.; Novak, D.; Becker, K. (I. Medizinische Klinik der Universitat, 2000 Hamburg 20, Martinistrasse 52, W. Germany). *Dtsch. Med. Wochenschr.* 101(9):329-334; 1976.

Three case reports of veno-occlusive disease in the liver are presented. A 32-yr-old man with a history of transient icterus and varicosities was found to have hepatosplenomegaly, ascites, and prominent presentation of veins on the lateral abdominal wall. Histologically, there was evidence of postnecrotic cirrhosis, and there was scintigraphic confirmation of a parenchymal defect. Cavography found the contrast medium to be arrested at the level of thoracic 12. Following death from liver coma, an autopsy showed subtotal caval occlusion from the diaphragmatic hiatus to the iliac veins. Especially at the diaphragm level, the vena cava was densely fibrous, with extensive thrombi. The main trunks of the hepatic veins were also extensively thrombosed, and the parenchyma showed partly confluent, partly centrilobular fibrosis. A 19-yr-old woman presented with lower limb edema, ascites, iliac and femoral vein occlusion, and caval narrowing at the level of thoracic 10-11, 3 weeks after the third pregnancy. Streptokinase and urokinase elicited generalized venous relief and revasculariza tion, with overall improvement. A 34-yr-old woman with a history of taking oral contraceptives presented with limb edema, hepatomegaly, lowered cholinesterase, hepatic vein occlusion, and caval narrowing. Liver biopsy showed sinusoidal ectasia, storage defect, and increased periportal stroma. Heparin, corticosteroids, saluretics, and aldosterone antagonists elicited only transient amelioration. At autopsy, the liver showed typical venous obliterative processes with stromal replacement, but without evidence of caval or hepatic trunk thrombosis. These cases illustrate the two mechanisms involved: thrombosis and obliterative devascularization (endophlebitis hepatica). The latter has two localizations, either the large hepatic veins, including the ostia, or the small sublobular and central veins or venules ("venoocclusive disease").

8886 IDENTIFICATION OF BILE ACIDS IN THE SERUM AND URINE IN CHOLESTASIS. EVIDENCE FOR 6 α-HYDROXYLATION OF BILE ACIDS IN MAN. (Eng.)

Summerfield, J. A.; Billing, B. H.; Shackleton, C. H. L. (Royal Free Hosp., Pont St., Hampstead, London NW3 2QG, England). *Biochem. J.* 154(2):507-516; 1976.

The bile acid pattern in large volumes of urine and plasma from two women with primary biliary cirrhosis was examined. The acids were subjected to a group separation and were identified by

mbined gas chromatography-mass spectrometry. The
chniques were developed to allow identification
the minor components of the bile acid mixture.
ur bile acids that have not been previously
scribed in human urine and plasma were detected:
,7α-dihydroxy-5β-cholan-24-oic acid; 3α,6α-
hydroxy-5β-cholan-24-oic acid (hyodeoxycholic
id); 3α,6α,7α-trihydroxy-5β-cholan-24-oic acid
yocholic acid); and 3α,7β,12α-trihydroxy-5β-
olan-24-oic acid. In addition, three C_{27} steroids
re found; 26-hydroxycholesterol and a trihydroxy
olestane, probably 5β-cholestane-3α,7α,26-triol,
re found in the sulfate fraction of plasma and
ine. In the plasma sample, a sulfate conjugate
24-hydroxycholesterol was found. These results
pport the hypothesis that there is an alternate
thway for bile acid metabolism in man, similar
that described in rats.

87 STUDIES IN CHOLESTASIS OF PREGNANCY: IV.
SERUM LIPIDS AND LIPOPROTEINS IN RELATION
DURATION OF SYMPTOMS AND SEVERITY OF THE DISEASE,
D FATTY ACID COMPOSITION OF LECITHIN IN RELATION
DURATION OF SYMPTOMS. (Eng.) Johnson, P.
ahlgren's Hosp., Univ. Goteborg, S-413 45 Gothen-
rg, Sweden). *Acta Obstet. Gynecol. Scand.* 54(4):
7-313; 1975.

matological data and information on serum lipids,
poproteins, and lecithin fatty acids were obtained
39 pregnant women with cholestasis of pregnancy
trace possible variations in the influence of
egnancy and cholestasis on liver metabolism.
ven patients had pruritus gravidum (PG) of short
ration, 11 had PG of long duration, 12 had hepa-
sis of pregnancy (HP) of short duration, and 9
d HP of long duration. Twenty women with uncom-
icated pregnancies served as controls. The mean
rum cholesterol level in the patients with HP of
ort duration (351 mg/100 ml) was significantly
gher than that in the controls (265 mg/100 ml).
e mean serum triglyceride level in the patients
th HP of short and long duration (278 and 250 mg/
0 ml, resp.) was significantly greater than that
the controls (180 mg/100 ml). In the patients
th HP of short duration, the mean serum phospho-
pid level (386 mg/100 ml) was significantly
gher than that in controls (283 mg/100 ml). The
gh density lipoprotein cholesterol level was
gnificantly lower in the patients with HP of long
ration (50 mg/100 ml) than of that in the controls
7 mg/100 ml). The low density lipoprotein chole-
erol level in the patients with HP of short dura-
on was significantly higher (212 mg/100 ml) than
at in controls (147 mg/100 ml). Serum iron was ele-
ted by 55% in HP of short duration. The palmitic
id level was significantly lower in CP of short
ration and even lower in CP of long duration. The
achidonic acid level was significantly higher in CP
short duration, while linoleic acid was signifi-
ntly lower. The molar ratio of linoleic to arachid-
ic acid was low (3.0) after CP of short duration
d high (4.9) after CP of long duration. The
sults support the hypothesis of an abnormal
action of liver metabolism to estrogens in the
itial stage of cholestasis of pregnancy.

8888 THE BILE SECRETORY FUNCTION OF THE HEPATOBILIARY SYSTEM DURING PREGNANCY. (Rus.) Vinogradova, M. R. (Inst. Obstetrics Gynecology, USSR Acad. Medical Sciences, Leningrad, USSR). *Akush. Ginekol. (Mosk.)* (7):38-42; 1975.

The bile secretory function of the hepatobiliary system was studied in 24 pregnant women presenting with dyspeptic symptoms or pains in the right hypochondrium. The investigation was performed by 5-min fractional examination after administration of a magnesium sulfate solution. The total bilirubin, cholesterol, and free fatty acid concentrations in the bile showed marked variation from one phase to the next, being highest during phase IV (B bile). The concentrating ability of the gallbladder increased with the advancement of the pregnancy, which accounted for the enteral release of considerable quantities of bile pigments, cholesterol, and free fatty acids. The findings suggest that a considerable portion of the bilirubin secreted by the liver in the advanced stages of pregnancy is in free form in the duodenal content. The tendency to spasm and increased tonus of Oddi's sphincter, observed during the first half of pregnancy, was followed by a tendency to retarded gallbladder evacuation during the second half.

8889 HYPOTHESIS: A MOLECULAR BASIS FOR THE HYPERAMMONEMIA AND POTASSIUM WASTAGE ASSOCIATED WITH HEPATIC FAILURE. (Eng.) .Zweig, J. I. (Beth Israel Medical Center, 10 Nathan D. Perlman Place, New York, NY 10003). *Mt. Sinai J. Med.* 43 (2):109-121; 1976.

A study was undertaken to determine if there was an association between blood ammonia and the dibasic amino acids during hepatic failure. Twenty patients in hepatic coma, 14 with liver disease and 6 without liver disease (controls), were studied. Among the patients with liver disease, the highest plasma lysine values occurred in those with an elevated venous ammonia. Of those with a venous blood ammonia above 200 mg/dl, none had a plasma lysine less than 24 µmol/dl. In the three patients who had arterial blood ammonia determinations >200 µg/dl, plasma lysine was ≤21 µmol/dl. In five of seven of the samples with elevated blood ammonia, plasma ornithine was also elevated. No conclusions were drawn regarding the effect on serum potassium or the blood urea nitrogen. In the control group, plasma lysine was ≤18 µmol/dl, and the plasma ornithine was <13 µmol/dl in four patients and 14 µmol/dl in one. This increase in lysine may be secondary to a decrease in its degradation by the liver and it may be the primary cause for the decreased urea production and increased ammonia formation via allosteric enzyme inhibition during hepatic failure. The potassium loss, also associated with liver failures, is explained on the basis of an intracellular surrogate ion effect of potassium that lysine appears to have. This mechanism may also be applicable in the case of ornithine, which bears a structural resemblance to lysine.

8890 FULMINANT LIVER FAILURE: CLINICAL AND EXPERIMENTAL STUDY.

(Eng.) Slapak, M. (Dept. Surgery, Univ. Cambridge, Cambridge, England). *Ann. R. Coll. Surg. Engl.* 57(5):234-247; 1975.

Clinical experience with some newer methods of hepatic support is presented, and an animal model based on carefully imposed ischemic hepatic insult in the absence of portacaval shunting is described. Among 21 patients in stage IV hepatic coma treated by exchange transfusion, 16 recovered consciousness, but only 4 survived. Exchange transfusion is costly, as it requires some 18 l of blood. Five of seven patients in stage IV hepatic coma regained consciousness during *ex vivo* perfusion, but none survived. Two patients were treated by cross circulation. The patient who received human-to-human cross circulation regained consciousness, but died of a hemorrhaging ischiorectal abscess, and the patient in whom a baboon was used as a cross-circulant never regained consciousness, despite a fall in prothrombin time from 60 to 18 sec. A previously described rat model in which the need for a portacaval shunt was eliminated is described. Because there were similarities in the hemodynamic disturbances found in this model and those found in septic shock, an experiment was devised to study the effect of reduction of alimentary bacterial content. In control rats that underwent colectomy, the mortality rate was 10%. Ninety minutes of hepatic ischemia in intact rats increased the mortality rate to 94%. However, if nonabsorbable kanamycin (1 mg/g) was given 2 days before operation and 2 days afterwards, the mortality was reduced to 21%. When bacterial reduction was accomplished by performing a colectomy, the mortality was 30%. In further experiments, the importance of portal flow on liver function and growth was assessed in hemihepatectomized dogs in which the remaining half of the liver was vascularized by the hepatic artery alone or in which portarenal transposition was performed. The latter procedure substituted renal venous blood and hepatic arterial blood for portal blood. Animals with hepatic arterial inflow only lost weight, had meat intoxication, and were hard to keep alive, even at 4 weeks; regeneration was only 14%. The course of the portarenal transposition, however, was entirely benign, and one animal has normal liver function 6 yr after the procedure. The authors concluded that if a specific regenerative factor was present in the portal blood, it required a minimal blood flow to the liver to be operative and that hepatic arterial blood flow was less than this minimum and was insufficient for normal hepatic regeneration. In a third series of experiments in dogs, it was concluded that liver grafts might be expected to be temporarily life-supporting in the absence of portal blood, in a heterotopic situation, and in the presence of an orthotopic liver.

8891 FOCAL NODULAR HYPERPLASIA OF THE LIVER AND INTRAHEPATIC HEMORRHAGE IN YOUNG WOMEN ON ORAL CONTRACEPTIVES.

(Eng.) Stauffer, J. Q.; Lapinski, M. W.; Honold, D. J.; Myers, J. K. (Dept. Medicine, State Univ. Hosp., 750 E. Adams St., Syracuse, NY 13210). *Ann. Intern. Med.* 83(3):301-306; 1975.

The cases of three young women (25-29 yr) on oral contraceptives in whom focal nodular hyperplasia o the liver was diagnosed are presented. The patien had taken oral contraceptives, including combinati of norethindrone plus mestranol and ethynodiolacet plus mestranol, for 6-7 yr. Patient 1 was gravida 1, para 1, while the other patients had never been pregnant. The first two patients presented with minimal clinical symptoms and a palpable mobile ma which was misdiagnosed as either an ovarian or mesenteric cyst. In patient 1, a single, 10-cm pedunculated mass arising from the left liver lobe was found and resected at surgery. The mass was highly vascular, but bleeding was controlled by ligatures at the base of the stalk. In patient 2, there were five areas of nodular hyperplasia, with central ischemic necrosis of the largest nodule and hemorrhagic necrosis in one of the smaller nodules. In both patients, the hepatocytes were altered, with vacuolated to clear cytoplasm and no evidence of nuclear atypia. There was a loss of a normal lobular pattern and absence of the normal plates of hepatocytes. In some areas there was a pseudorosette pattern. None of the specimens had fibrous tracts coalescing in the center of the lesions. There was no evidence of metastatic disease in either patient. Patient 3 presented wi massive intrahepatic hemorrhage, and, although no nodules were identified, the authors suspect that this represented a variant of the syndrome. They suspect that the intrahepatic hemorrhage in this patient was related to necrosis of a small nodule, with subsequent massive intrahepatic hemorrhage such that the area of nodular hyperplasia could no longer be recognized grossly. This patient surviv the hemorrhage, probably because it occurred in th lateral aspect of the right lobe, with compression of the bleeding area by the chest wall. This unus case was included in the series to stress that massive intranepatic hemorrhage may occur in young women who are on oral contraceptives, and that foc nodular hyperplasia may not be readily apparent at exploration. No patient has had recurrent nodule formation, but oral contraceptive use has not been reinstituted. The increased incidence of focal nodular hyperplasia of the liver in young women suggests a possible etiologic relation to long-ter contraceptive use.

8892 PATHOGENESIS OF PROTRACTED AND CHRONIC FORMS OF CHOLANGIOLITIC HEPATITIS.

(Rus. Bychkova, V. I. (Dnepropetrovsk Medical Inst., Dnepropetrovsk, USSR). *Ter. Arkh.* 48(3):71-73; 1976.

The pathological anatomy of protracted and chronic cholangiolitic hepatitis was studied in 23 patients in whom diagnostic laparotomy was performed after unsuccessful long-term drug therapy. Moderately enlarged, dense liver of green color was found in all patients. Lesion of all extrahepatic bile duct was observed in one patient; lesion of the common bile duct, especially of the distal portion, in six lesion of the common bile duct and of one hepatic or cystic duct in five; lesion of the common bile duct and of the gallbladder in three; and perichola gitis and pericholecystitis in four. The walls of ducts and of the gallbladder were thickened and dened, and their lumina were stenosed or sometimes iterated. Lympho-histiocytic infiltration of the ls of the ducts and of the gallbladder and proliftion of the connective tissue in the submucosa subserosa were observed. Distention of the galldder and of the common bile duct was observed in ee cases. Enlargement and hardening of the head the pancreas were observed in 11 cases. The lapaomy and the biochemical findings (hyperlipemia h predominant hypertriglyceridemia) indicate that erosis and stenosis of the distal portions of the e ducts are one of the causes of chronic and procted cholangiolitic hepatitis.

3 IMMUNOLOGICAL PARAMETERS, VIRAL ANTIBODIES, AND BIOCHEMICAL AND HISTOLOGICAL FINDINGS RELATIVES OF PATIENTS WITH CHRONIC ACTIVE HEPAIS AND PRIMARY BILIARY CIRRHOSIS. (Eng.) Salaso, M. P.; Laitinen, O. I.; Lehtola, J.; Makkonen, Rasanen, J. A.; Sipponen, P. (Second Dept. Medie, Univ. Helsinki, 00290 Helsinki 29, Finland). *nd. J. Gastroenterol.* 11(3):313-320; 1976.

ety-seven first-degree relatives of 23 propositi h either typical chronic active hepatitis (CAH, or primary biliary cirrhosis (PBC, 10) were examd for different viral and tissue antibodies, immulobulins (Ig), and biochemical parameters. Signiantly higher prevalences of tissue antibodies were ed mostly in the relatives of the CAH patients. ormalities in Ig levels were frequently found in h groups, but no difference in Ig or complement els was noted between the groups. Instead, there a marked clustering of abnormalities in some ilies. The age of the relatives and the patholcal Ig values were not related. Very high antiy titers to measles and rubella occurred only in atives of the CAH patients, and even then the h titers were clustered in only three families. y when relatives had biochemical abnormalities a liver biopsy performed. Unspecific inflammay changes were noted in five relatives of CAH ients and in four relatives of PBC patients. two relatives of PBC patients and in one relative CAH patients, active liver disease was detected. ked accumulation of various immunological and topathological abnormalities was noted in four ilies. The results of this study support the othesis of a genetic predisposition for the elopment of either CAH or PBC.

4 GLYCOGENIC FUNCTION OF THE LIVER IN PATIENTS WITH ICHTHYOSIS. (Rus.) Kuklin, V. T.; tsov, V. K.; Belinskaia, R. G.; Velichanskaia, B. (Dept. Skin and Venereal Diseases, Irkutsk ical Inst., Irkutsk, USSR). *Vestn. Dermatol. erol.* (2):56-59; 1976.

od sugar curves were determined after administran of 100 g of glucose in 43 patients with xeroma, in 18 patients with nacreous form of ichosis vulgaris, and in 9 patients with ichthyosiform erythroderma. The patients included both children and adults. The blood sugar curves were normal in 26 cases (15 cases of xeroderma, 6 cases of nacreous ichthyosis, and 5 cases of ichthyosiform erythroderma); torpid (with 30% hyperglycemia in 30-60 min) in 29 (17 cases of xeroderma, 10 cases of nacreous ichthyosis, and 2 cases of ichthyosiform erythroderma), irritative (rapidly rising and falling) in 1 patient each with xeroderma and nacreous ichthyosis, and paradoxical (declining during the first 30-60 min) in 1 patient each with xeroderma and nacreous ichthyosis. The blood sugar curve showed no definite pattern in 11 cases. The high incidence of torpid blood sugar curves and their normalization in 2 hr indicate the reduced excitability of the sympathetic nervous system and suggest the decrease of the oxidative processes in the hepatocytes and reduced hepatic glucokinase activity. The increased neutral mucopolysaccharide level in the horny layer appears to be linked to the reduced assimilation of glycogen by the epidermal cells. The findings indicate no impairment of the functional activity of the islands of Langerhans in ichthyosis.

8895 HEPATOCYTE ENZYME INDUCTION BY PHENOBARBITAL: APPLICATIONS IN THE THERAPY OF JAUNDICE. (Fre.) Nusinovici, V.; Darnis, F.; Levy, V. G.; Coroli, J. (Hopital Saint-Antoine, 184, rue du fg Saint-Antoine, 75012 Paris, France). *Sem. Hop. Paris Ther.* 52(3):171-174; 1976.

Phenobarbital (PB)-induced liver enzyme induction and its role in icterus therapy are reviewed. Regression of the pruritus was achieved in four hypercholestatic hepatitis patients, with a near total disappearance of the interlobular bile ducts; cholestyramine was ineffective. Icterus is more refractory to PB than pruritis. At best, PB can induce a moderate decrease in bilirubinemia. In two of four of the cholestatic hepatitis patients, a decrease followed by a significant increase in bilirubinemia occurred after PB interruption. The pruritis regresses due to reduction of the plasma bile acid level. There was a reduction in both total lipids and total cholesterol, triglycerides, and phospholipids from 40-60 to 20 g/l in 2-3 months in these four patients. Infants tolerate 3-12 cg PB without difficulty. The daily adult dose is usually 15-25 cg; doses >30 cg induce arthralgias after several weeks. Osteomalacia and acute intermittent porphyria are rare complications. Chronic congenital icterus with nonconjugated bilirubin is probably due to a deficit in glucuronyl transferase or protein Y activity. PB doses of 6-18 cg/day in some cases reduce the bilirubinemia to near normal levels. Maternal administration of PB just prior to parturition significantly suppresses the intensity of neonatal icterus. Dicophane and ethyl alcohol elicit similar effects. PB has been used routinely in intrahepatic cholestases, including primary biliary cirrhosis, cholestatic hepatitis, and pediatric atresia of the intrahepatic bile ducts; and glutethimide may also be used. PB modifies icterus, bile acid metabolism, and any concomitant pruritis, hyperlipemia, and xanthomatosis.

8896 CHOLESTATIC JAUNDICE. (Eng.) Javitt, N. B. (New York Hosp.-Cornell Medical Center, New York, NY 10021). *Med. Clin. North Am.* 59(4): 817-821; 1975.

A review and discussion of information concerning cholestatic jaundice is presented. Cholestasis is best detected by an increase in serum bile acid concentration and is a feature of most, if not all, diseases of the liver and biliary tract. In both anicteric A or B viral hepatitis and in chronic active hepatitis, serum bile acid levels are elevated. In the former case, the level is a sensitive indicator of recovery from the disease, and in the latter case, the degree of elevation appears related to the severity of the illness. Although sufficient data have not been accumulated on the relative merit of using serum bile acid in the evaluation of biliary tract disease, a knowledge of the serum bile acid concentration is necessary if the disease is managed by the administration of bile acid preparations. The only other indicator of the presence of cryptogenic cholestasis, in addition to elevated bile acid levels, is the presence of pruritus. Because there is no associated defect in bilirubin excretion in neonatal cholestatic syndromes, patients develop conjugated hyperbilirubinemia only when the cholestasis is most severe and there is no bile flow. The only known treatment for this disease is the reduction of the bile salt load on the liver by the use of anion-exchange resins, such as cholestyramine, to prevent the reabsorption of bile acids from the intestine. This treatment is also effective in primary biliary cirrhosis. The two prominent features of primary biliary cirrhosis occurring early in its course and before cirrhosis are: an inflammatory reaction in the portal areas, with bile ductules as the apparent target with necrosis of biliary epithelium, and severe cholestasis associated with pruritus. Patients with primary biliary cirrhosis must be warned not to take medications other than those used in the treatment of the disease, as many drugs are at least partly metabolized and excreted in bile.

8897 EXTRAHEPATIC PORTAL HYPERTENSION AND PREGNANCY. (Ger.) Huchzermeyer, H. (Abteilung fur Gastroenterologie und Hepatologie, Department Innere Medizin der Medizinischen Hochschule Hannover, Karl-Wiechert-Allee 9, D-3000 Hannover, W. Germany). *Leber Magen Darm* 5(5):209-213; 1975.

The interrelation between pregnancy and portal hypertension was analyzed in patients with prehepatic block. The clinical sample included six patients. All cases had protracted histories of bleeding from esophageal varices. A mesentericocaval anastomosis was ineffective in one patient, and an unexceptional pregnancy was interrupted in the fourth month; the bleeding did not resume. Another pregnancy was interrupted in a patient with splenorenal anastomosis. A third patient, in whom anastomoses were technically not possible, succumbed from a recurrent mediastinitis during the first trimester. A fourth case, with splenectomy and splenorenal anastomosis after portal thrombosis and melena, had a complication-free pregnancy and a healthy baby. A fifth patient present with a history of splenomegaly and hematemesis. Splenectomy followed a suspicion of splenic vein thrombosis. A mesentericocaval anastomosis was no possible because of a cavernous transformation of the portal vein and superior mesenteric artery and portal pressure of 30 cm H_2O. There was no eviden of cirrhosis. Melena preceeded a complication-fre pregnancy and a healthy baby. The sixth patient h a successful first pregnancy after splenectomy for hematemesis, but massive intestinal bleeding occur during a second pregnancy. Icterus developed seco ary to post-transfusion hepatitis. Postpartum fun tion tests found elevated transaminases, hypalbumi mia, and hypergammaglobulinemia. Active chronic hepatitis was discovered during a third pregnancy, with icteric episodes and decompensated cirrhosis. Since portal hypertension is a physiological rule in pregnancy, pathological hypertension is exacerbated. The physiological changes of the circulato system during pregnancy may be responsible for the observed complications; i.e., temporary increases portal pressure tend to aggravate the preexisting extrahepatic portal hypertension.

8898 FATTY LIVER: BIOCHEMICAL AND CLINICAL CONSIDERATIONS. (Eng.) Hoyumpa, A. M., Jr.; Greene, H. L.; Dunn, G. D.; Schenker, S. (Vanderbilt Univ. Medical Sch., Nashville, TN 37203). *Am. J. Dig. Dis.* 20(12):1142-1170; 1975.

The main clinical and biochemical features of the principal conditions associated with fatty liver a reviewed. Normal hepatic lipid metabolism and ethanol-induced fatty liver, kwashiorkor, obesity and intestinal bypass, diabetes, idiopathic fatty liver of pregnancy, Reye's syndrome, and inherited metabolic disorders are discussed. The induction of fatty liver by tetracyclines and other drugs is also discussed. Steatosis is a common and nonspec response of the liver to different forms of acquir injury or inherited metabolic derangement. Fatty liver can be acute and fulminating, as in fatty li of pregnancy and Reye's syndrome, or insidious and benign, as in the fatty liver of obesity and diabe Its presence is best detected by histological exam tion, and the differential diagnosis is aided by noting the fat distribution in the hepatic lobule and the location of the nucleus in the hepatocyte. In the more common types of fatty liver (alcoholic kwashiorkor, obesity, post-jejunoileal bypass, and diabetes), the cytoplasm of the hepatocyte is distended by large fat globules that displace the nucleus peripherally. Fine intracellular fat vacuole that do not displace the nucleus suggest idiopathi fatty liver of pregnancy, tetracycline toxicity, Reye's syndrome, or cholesterol ester storage disease. Moreover, a centrilobular fat distribution suggests idiopathic fatty liver of pregnancy, rath than tetracycline toxicity or Reye's syndrome. In very severe cases, differentiation based on lobula fat distribution can be obscured; for example, the usual periportal fatty change in kwashiorkor and the centrolobular fat distribution in obesity both become diffuse in the severe forms of these disord Further investigation of the different steps in th ansport, uptake, formation, and secretion of lipids the liver is needed, and these functions must be elated to the different structures and functions the hepatocyte organelles, both under normal and onormal conditions.

399 EARLY DIAGNOSIS OF HEPATOLENTICULAR DEGENERATION IN CHILDREN.

(Rus.) Bondarchuk, A. .; Vakharlovskii, V. G.; Kliorin, A. I.; Meliucheva, . A.; Shavlovskii, M. M.; Iakovnika, E. O.; Neifakh, . A. (Inst. Experimental Medicine, USSR Acad. Medical ciences, Leningrad, USSR). *Vopr. Okhr. Materin. Det.*)(12):28-33; 1975.

eventy case histories, including 18 new cases, of epatolenticular degeneration were analyzed with espect to the possibilities of early diagnosis. isceral symptoms (jaundice, hepatomegaly, hepatoplenomegaly, arthralgia, hemorrhagic symptoms, and emolytic episodes) were the first manifestation f the disease in 48 cases. These symptoms usually ppeared at the age of 10-12 yr. Changes in the EG were already found in some patients during the isceral stage of the disease. The preclinical tage of hepatolenticular degeneration was diagnosed n 1 of 29 children examined for suspected chronic epatitis by the serum ceruloplasmin test and other iochemical tests. The same stage of hepatolenticlar degeneration was diagnosed in two siblings. he findings indicate that in the presence of visceral ymptoms, the early diagnosis of hepatolenticular egeneration is possible by the serum ceruloplasmin est; to confirm the diagnosis, the determination f the 24-hr copper and amino acid excretion in the rine, the determination of copper in liver biopsy amples, and an EEG should be performed. The eyes hould be examined through slit lamp for Kayserischer rings. Treatment initiated before the anifestation of neurological symptoms can prevent heir development.

900 HEPATIC ZONAL DEGENERATION AND NECROSIS IN REYE SYNDROME.

(Eng.) Brown, R. E.; Isak, K. G. (J. C. Blair Memorial Hosp., Huntingdon, A). *Arch. Pathol. Lab. Med.* 100(3):123-126; 1976.

he clinicopathological features in seven children ith Reye's syndrome associated with considerable epatic zonal degeneration and/or necrosis are preented. The primary findings in these cases fit into the clinicopathological spectrum of Reye's synrome. All patients had antecedent febrile or viral ype of illness, followed by vomiting, encephaloathy, and death. Cerebral edema occurred in five atients. Small-droplet fatty accumulation was een in the viscera at autopsy in six cases. Only wo patients were jaundiced, and there was only a ild to moderate elevation in total serum bilirubin 1.9-4.4 mg/100 ml) in the four patients in whom his was measured. None of the patients had a istory of exposure to toxins, including phosphorus. eripheral zonal degeneration without necrosis was evealed in liver sections from two patients, characerized by distinctive ballooning. Peripheral onal necrosis without ballooning was present in three cases. Peripheral zonal degeneration and hemorrhagic necrosis were present together in two patients. Cytoplasmic cholestasis occurred in six cases, canalicular cholestasis in three, and acute cholangiolitis in three. The authors hypothesize that fatty acids are the agents most likely to be responsible for the pathogenesis of the peripheral zonal alterations in these patients.

8901 VINYL CHLORIDE-ASSOCIATED LIVER DISEASE.

(Eng.) Berk, P. D.; Martin, J. F.; Young, R.; Creech, J.; Selikoff, I. J.; Falk, H.; Watanabe, P.; Popper, H.; Thomas, L. (Section on Diseases of the Liver, Digestive Diseases Branch, Natl. Inst. Arthritis, Metabolism and Digestive Diseases, Building 10, Room 4D-52, NIH, Bethesda, MD 20014). *Ann. Intern. Med.* 84(6):717-731; 1976.

Two cases of vinyl chloride-associated liver injury, one hepatic fibrosis and one angiosarcoma, that occurred in two men are presented. The fibrosis occurred in a 30-yr-old vinyl chloride polymerization worker who, for the first 5.5 yr of his 8-yr career, was involved in cleaning the polymerization tanks, an operation associated with high exposure. His case demonstrated that vinyl chloride-associated hepatic fibrosis persists after removal from further exposure and that the lesions may be extensive even though standard liver function tests have normal findings. The angiosarcoma occurred in a 42-yr-old man who had been doing the same task for 2 yr. In each patient, the histologic features were similar to the hepatic fibroses and angiosarcomas associated with chronic exposure to inorganic arsenicals. It is suggested that the toxicity of vinyl chloride may result from the formation, during high-dose exposure, of active metabolites by mixed function oxidases of the liver.

8902 THE EFFECT OF LONG TERM TREATMENT WITH PENICILLAMINE ON THE COPPER CONTENT IN THE LIVER IN PATIENTS WITH WILSON'S DISEASE.

(Eng.) Marecek, Z.; Heyrovsky, A.; Volek, V. (I. Medizinische Klinik der Karls-Universitat, 128 08 Prague Unemocnice 2, Czechoslovakia). *Acta Hepatogastroenterol.* 22(5):292-296; 1975.

The effect of long-term treatment with penicillamine on the hepatic copper content was studied in 35 biopsy specimens of 17 patients with Wilson's disease. At the time of the study, the patients' urinary Cu levels ranged between 76 and 889 μg/24 hr, and the serum Cu levels ranged between 21 and 73 μg/100 ml. The pretreatment hepatic copper levels among nine patients ranged between 682 and 1,520 μg/g dry liver. In six patients treated with penicillamine (1,000-1,500 mg/day) for 1-2 yr, the liver Cu concentrations ranged between 570 and 860 μg/g dry liver. In five patients treated for 3-4 yr, the levels were between 389 and 688 μg/g dry liver; in five patients treated for 5-7 yr, 288-356 μg/g; in one patient treated for 8-10 yr, 208 μg/g; and in one patient treated for 11 yr, 139 μg/g. When the mean hepatic Cu levels were plotted against years of treatment, it was shown that during the course of treatment, the Cu content decreased gradually and very slowly reached the normal level (250 μg/g dry liver). There was a significant positive correlation between urinary and hepatic Cu concentrations, both before and during treatment. Thus, the urinary Cu content is a good indirect indicator of hepatic copper concentration.

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8904 RESULTS AND COMPLICATIONS OF LIVER LYMPHOGRAPHY IN THE DOG [Abstract]. (Eng.) Burgener, F. A.; Fischer, H. W.; Weber, D. A. (Dept. Radiology, Univ. Rochester, Rochester, NY 14642). *Invest. Radiol.* 10(5):471; 1975.

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8906 THE EFFECTS OF VARIOUS ANAESTHETICS AND ABDOMINAL SURGERY ON LIVER BLOOD FLOW IN MAN [Abstract]. (Eng.) Cowan, R. E.; Jackson, B. T.; Thompson, R. P. H. (St. Thomas' Hosp., London, England). *Gut* 16(10):839; 1975.

8907 EFFECT OF ARTERIALIZATION OF THE LIVER UPON THE INCIDENCE OF coli AGGLUTININS [Abstract]. (Eng.) Schneider, K.; Penner, E.; Gangl, A.; Rotter, M.; Grabner, G. (Ordinariat fur Gastroenterologie, Univ. Wien, Vienna, Austria). *Digestion* 12(4/6):349; 1975.

8908 FUNCTIONAL STATE OF THE LIVER DUE TO NARCOSIS AND SURGERY. (Rus.) Mikhelson, V. A.; Zhdanov, G. G.; Chernobelskii, A. M. (Clinic Pediatric Surgery, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Khirurgiia* (10):89-92; 1975.

8909 ORIGIN OF ALKALINE PHOSPHATASE ISOENZYMES IN PATIENTS WITH LIVER DISEASE [Abstract]. (Eng.) Laurijssens, M. J. (Clinic M. Middelares, Sint-Niklaas). *Digestion* 12(4/6):323-324; 1975.

8910 REDUCED METABOLIC CLEARANCE OF HEXOBARBITONE IN PATIENTS WITH ACUTE AND CHRONIC LIVER DISEASE. (Eng.) Breimer, D. D.; Zilly, W.; Richter, E. (Dept. Pharmacology, Univ. Leyden, Netherlands). *Pharm. Weekblad* 110(51/52):1299-1302; 1975.

8911 ASPECTS OF BILE ACID METABOLISM IN LIVER DISEASES. (Ger.) Horak, W. (Ordinariat fur Gastroenterologie, Universitat Wien, Vienna, Austria). *Acta Med. Austriaca* (Suppl. 4):1-39; 1975.

8912 OESTROGEN METABOLISM IN CHRONIC LIVER DISEASE: A NEW LEAD [Abstract]. (Eng.) Green, J. R. B.; Mowat, N. A. G.; Fisher, R. A.; Anderson, D. C.; Dawson, A. M. (St. Bartholomew's Hosp., London, England). *Br. Soc. Gastroenterol.* 16(10):831; 1975.

8913 DOES SERUM HIGH-DENSITY LIPOPROTEIN (HDL CONTENT CORRELATE WITH LIVER DAMAGE [Abs tract]? (Eng.) von Lehmann, B.; Grajewski, O.; Oberdisse, E.; Arntz, H.-R. (Pharmakologisches Institut der Freien Universitat Berlin, Berlin, E. Germany). *Digestion* 12(4/6):324; 1975.

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8916 RED BLOOD CELLS AND SERUM PHOSPHOLIPIDS CHRONIC LIVER DISEASES [Abstract]. (En Curri, S. B.; Andreuzzi, P.; Rocchetti, P. G.; Cantoni, L. (Ospedale Maggiore "Ca Granda," Milan Italy). *Digestion* 12(4/6):297-298; 1975.

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8924 ULTRASTRUCTURAL FEATURES OF PRIMARY LIVER CELL CARCINOMA. RELATIONSHIP OF CYTOPLASMIC INCLUSIONS TO ALCOHOLIC HYALINE [Abstract]. (Eng.) Luisa Cristina, M.; Baptista, A. (Dept. Pathology, Univ. Lisbon, Lisbon, Portugal). *Digestion* 12(4/6):297; 1975.

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8926 SERUM ALPHAFETOPROTEIN LEVELS IN LIVER DISEASE: RELATION TO HEPATOCELLULAR REGENERATION AND DEVELOPMENT OF HEPATOMA [Abstract]. (Eng.) Eleftheriou, N.; Thomas, H.; Heathcote, J.; Sherlock, S. (Royal Free Hosp., Pond St., London, England). *Gut* 16(10):835; 1975.

8927 HYPERCALCEMIA IN PRIMARY HEPATOMA [Abstract]. (Eng.) Triandafillou, G.; Thallasinos, N.; Tzemailas, N.; Andreadis, C. ("Tzanion" General Hosp., Piraeus, Greece). *Digestion* 12(4/6):356; 1975.

8928 TUBULORETICULAR STRUCTURES IN HEPATIC ENDOTHELIAL CELLS IN A CASE OF MALIGNANT MELANOMA LIVER METASTASIS. (Eng.) Oliveira Soares, J.; Chaves Serras, A.; Moura Nunes, J. F. (Hosp. de Santa Maria, Lisboa, Portugal). *Experientia* 31(11):1345-1346; 1975.

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8933 A MORPHOMETRIC STUDY OF CHOLESTASIS IN MAN [Abstract]. (Eng.) Capurso, L.; Koch, M. M.; Freddara, U.; Lorenzini, I.; Jezequel, A. M.; Orlandi, F. (Malattie dell'Apparato Digerente e Farmacologia Cellulare dell'Universita, Ancona, Italy). *Rend. Gastroenterol.* 7(3):252; 1975.

8934 CHOLESTASIS IN MAN. A REEVALUATION OF ULTRASTRUCTURAL DATA. (Eng.) Jezequel, A. M.; Freddara, U.; Capurso, L.; Orlandi, F. (Cell Pharmacology, Digestive Diseases Unit., Univ. Ancona, Ancona, Italy). *Fegato* 20(4):299-314; 1974.

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8937 FALSE NEUROTRANSMITTERS AND HYPOTENSION IN FULMINANT HEPATIC FAILURE [Abstract]. (Eng.) Trewby, P. N.; Chase, R. A.; Murray-Lyon, I. M.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 12(4/6):355-356; 1975.

8938 LEUCOCYTE FUNCTION IN FULMINANT HEPATIC FAILURE [Abstract]. (Eng.) Bailey, R. J.; Woolf, I. L.; Cullens, H.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 12(4/6): 286; 1975.

8939 MECHANISM OF HYPONATRAEMIA IN FULMINANT HEPATIC FAILURE [Abstract]. (Eng.) Alam, A.; Wilkinson, S. P.; Moodie, H. E.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 12(4/6):281; 1975.

8940 PLASMA PROSTAGLANDINS IN FULMINANT HEPATIC FAILURE. (Eng.) Trewby, P.; Bennett, A.; Murray-Lyon, I. M.; Williams, R. (King's Coll. Hosp. Medical Sch., London, SE5 8RX, England). *Br. Med. J.* 4(5994):442; 1975.

8941 CYTOTOXICITY OF PLASMA FROM PATIENTS WITH ACUTE HEPATIC FAILURE TO ISOLATED LIVER CELLS [Abstract]. (Eng.) Hughes, R. D.; Cochrane, A. M. G.; Thomson, A. D.; Murray-Lyon, I. M.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 12(4/6):313-314; 1975.

8942 RADIOISOTOPIC ASSESSMENT OF THE JAUNDICE
PATIENT. (Eng.) Arkles, L. B. (Repatri
tion General Hosp., Melbourne, Australia). *Aust.*
N.Z. J. Med. 5(6):593-594; 1975.

8943 EARLY CHANGES INDUCED BY DIETHYLNITROSAM
AND CORRELATION WITH THE SEQUENCE OF EVE
OF MACROMOLECULAR SYNTHESIS DURING EXPERIMENTAL
IRREVERSIBLE NODULAR HYPERPLASIA IN RAT LIVER [Abs
tract]. (Eng.) Nievel, J. G. (King's Coll. Hosp.
Medical Sch., Denmark Hill, London, SE5 8RX, England). *Biochem. Soc. Trans.* 3(6):1237-1239; 1975.

See also, 8425, 8431, 8532, 8538, 8601, 8602, 8603
8607, 8617, 8634, 8636, 8646, 8659, 8660
8664, 8665, 8669, 8672, 8683, 8755, 8762
8784, 8805, 8955, 8956, 8990, 9010, 9048
9051, 9087, 9092, 9124, 9130, 9143, 9145
9148, 9149, 9164, 9165, 9173.

LIBRARY U. OF I. [illegible]

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

8944 EXPERIENCE WITH THE PHOTOTHERAPY OF NEWBORN INFANTS. (Ger.) Mucke, J.; Raue, W.; Klossek, D.; Kothe, Ch.; Winiecki, P. (Kinderklinik des Bereichs Medizin der Karl-Marx-Universitat, 705 Leipzig, Oststr. 21-25, E. Germany). *Dtsch. Gesundheitswes.* 31(1):38-42; 1975.

The results of phototherapy in neonatal metabolic hyperbilirubinemia are reported. The clinical sample included 900 infants with serum bilirubin in excess of 14 mg%. Approximately 70 cm of skin surface was exposed; the radiation strength was equivalent to 0.7 milliwatts/cm^2 and was administered until unequivocal serum bilirubin depression. Enzyme induction by phenobarbital (10 mg/kg/day x 2) occurred on postnatal days 1-3. Significant serum bilirubin decreases were achieved by postnatal days 5-7 in neonates with birth weights above 2,500 g, compared to those in neonates with birth weights below 2,500 g ($p=0.01$). By day 4, neonates receiving both phototherapy and enzyme induction had significantly lower serum bilirubin ($p=0.05$) than the group receiving phototherapy only, independent of birth weight. Transfusions did not affect the phototherapy result. Phototherapy sequelae included a 0.5-1.5 C hypothermia without generalized distress in 87 cases; respiratory frequency was increased in 35 cases. Phototherapy in Rh and ABO incompatibility is recommended.

8945 EFFECT OF PHOTOTHERAPY ON HEPATIC EXCRETORY FUNCTION IN NEWBORNS AS MEASURED BY
BROMSULPHALEIN CLEARANCE. (Eng.) Rubaltelli, F.
F.; Donzelli, F.; Largajolli, G. (Dept. Pediatrics
Univ. Padua, I-35100 Padua, Italy). *Biol. Neonate*
26(5/6):333-336; 1975.

To determine whether the excretion of unconjugated
bilirubin is mediated by an enhanced general
biliary excretion of other biliary components, the
clearance of BSP was studied in 12 jaundiced newborns both before and after phototherapy. The
mean unconjugated bilirubin level was 12 mg/100 ml
The BSP clearance graph showed that the percentage
of BSP disappearance was not significantly different before and after phototherapy. The results ar
consistent with the hypothesis that phototherapy
causes the photodegradation of bilirubin and that
the increased excretion of unconjugated bilirubin
is not mediated by a generalized enhancement of
the hepatic output.

8946 BILIRUBIN REMOVAL BY ANION-EXCHANGE RESI
(Eng.) Lopukhin, U. M.; Shurkalin, B. K.
Leykin, U. A.; Evseev, N. G.; Molodenkov, M. N.; K
netzov, V. N.; Gorchakov, V. D.; Blagosklonov, A.
(2nd Moscow Medical Inst., Malaya Pirogovskaya 1A,

oscow, USSR). *Lancet* 2(7932):461; 1975.

n anion-exchange resin was used to remove bilirubin rom a jaundiced patient. The patient, a 71-yr-old n, had an enlarged gallbladder and a solid liver argin with several palpable swellings. The SGOT, PT, and serum total bilirubin were 70 mU/ml, 50 mU/ l, and 12.9 mg/dl (direct 8.7), resp. Conventional onservative treatment (including glucose infusions, ntibiotics, and corticosteroids) was ineffective. emosorption was undertaken. After heparin infusion, e patient's blood was perfused through a polyethylacrylate column filled with 70 g of the anion- xchange resin MCTI-2A for 30 min. The arterial d central venous pressures, hematocrit, and acid- ase balance did not change. The platelet count ell by 10-12%, but the WBC count did not change. e total bilirubin fell by a third, from 15.6 to .5 mg/dl (14.0-7.5 direct). The electrolyte, urea, d glucose levels did not change. The total pro- ein fell from 6.2 to 5.3 g/dl, and the calcium oncentration fell from 7.7 to 6.0 mg/dl. The next ay, the patient's condition was improved, and the otal bilirubin was 13.8 mg/dl (direct 6.6). ollowing removal of a large tumor of the ampulla f Vater, the total bilirubin was 7.9 mg/dl (direct .2). The results suggest that it is possible to emove bilirubin from the blood of patients with bstructive jaundice, using hemosorption on blood- ompatible anion-exchange resin.

947 CHRONIC HYPERBILIRUBINEMIA ASSOCIATED WITH HEPATIC UPTAKE AND STORAGE IMPAIRMENT. A EW SYNDROME RESEMBLING THAT OF THE MUTANT SOUTHDOWN HEEP.

(Eng.) Dhumeaux, D.; Berthelot, P. (Dept. 'Hepatogastroenterologie, Hopital Henri Mondor, 4010 Creteil, France). *Gastroenterology* 69(4):988- 93; 1975.

case of chronic benign hyperbilirubinemia associ- ted with a marked impairment of hepatic uptake and torage of cholephilic organic anions is presented. he patient, a 19-yr-old woman, had a 10-yr history f chronic jaundice. She presented with slight left ypochondrium pain, moderate asthenia, and chronic arkening of the urine. The extreme values for serum otal bilirubin were 2.9 and 5.2 mg/100 ml, but all ther hepatic function tests were normal. Opacification of a normal gallbladder followed p.o. administra- ion of iopanoic acid (6 g), but only after a 20-hr elay. A 5-hr infusion of methylglumine adipiodone (15 g) failed to visualize the bile ducts. Hepatic ilirubin uridine diphosphate-glucuronyl transferase activity was normal. The serum bile acid concentra- tion was less than 1 μg/ml. The BSP plasma disappear- ance rate (K_1) was markedly reduced (0.050; normal, .145), and there was no plasma secondary rise of the dye. Eight percent of BSP found in the plasma 40 min after an i.v. injection of 5 mg/kg was conjugated. BSP urinary excretion was about 5% of the dose adminis- tered; 52% of the dye in the urine was conjugated. Following the i.v. injection of 4 mg/kg dibromosulfophthalein, 5 mg/kg rose bengal, or 0.5 mg/kg indocyanine green, the K_1 values were 0.021 (normal, 0.234), 0.026 (normal, 0.077), and 0.028 (normal, 0.185), resp. The relative storage capacity (*S*) for BSP was markedly reduced (20.0 mg/100 ml; normal, 67.7 mg/100 ml). *S* for dibromosulfophthalein was decreased (31.1 mg/ 100 ml; normal, 124.6 mg/100 ml), as was the biliary transport maximum (*Tm*) for both dibromosulfophthalein (4.4 mg/min) and BSP (5.7 mg/min). The percentage of the infused dose excreted in the urine during the *Tm* and *S* tests was about 8% for BSP and 11% for dibromosulfophthalein; 25% of BSP in the urine was conjugated. Phenobarbital (100 mg/day, 15 days) administration did not modify either serum bilirubin or BSP K_1. This new form of chronic benign hyperbilirubinemia seems to be primarily due to a defect of hepatic uptake and storage, and closely resembles the disease observed in mutant Southdown sheep.

8948 OCCURRENCE OF BENIGN CONJUGATED HYPERBILIRUBINEMIA WITH PIGMENT IN THE LIVER (DUBIN-JOHNSON'S SYNDROME). PART I.

(Slo.) Sosovec, V.; Ivicic, L.; Gaspar, I.; L'Achova, B. (Vnutorne oddelenie, Nemocnica s poliklinikou, Levoca, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(6):400-405; 1975.

The nature of Dubin-Johnson syndrome (DJS) and its clinical manifestations are reviewed, and 11 cases in four Gypsy families are described. Patients included a 3-week-old infant (possibly the youngest individual with diagnosed DJS), six children aged 6-14 yr, and four adults aged 18-78 yr. Liver enlargement was observed in seven cases. The serum level of total bilirubin varied between 1.9 and 6.6 mg% (with the exception of the infant, in whom icterus neonatorum gravis was suspected), while that of conjugated bilirubin varied from 0.4 to 4.5 mg%. Bilirubin was present in the urine in all but two cases, serum glutamate-pyruvate transaminase levels were within the normal range in all patients, and alkaline phosphatase levels were clearly elevated in five cases. Of the seven cases in which i.v. cholecystography was performed, the filling of the gallbladder with contrast medium took 3-7 hr in two cases and 15-17 hr in another two, continuing even after 24 hr. Thus, the absence of gallbladder filling cannot be considered a diagnostic criterion. The BSP test revealed two peaks (retention in the blood was less after 45 min than after 210 min) in all the patients, indicating its diagnostic value; liver biopsy confirmed the diagnosis in all nine cases in which it was performed. The serum cholesterol level varied over a wide range, but was clearly high in all the adults, while no essential deviations in prothrombin time were observed. Three cases could be considered to have progressed asymptomatically. Although no kinship ties among the four families studied were established, the possibility cannot be excluded, since Gypsies live in isolated groups. The father of one family had married his mother's cousin, by whom he had eight children, four of them DJS patients. This is not necessarily sufficient proof of genetic carriership of DJS, however.

8949 NEONATAL JAUNDICE AS A CAUSE OF DEAFNESS.

(Eng.) Fenwick, J. D. (Queen Elizabeth Hosp., Edgbaston, Birmingham 15, England). *J. Laryngol. Otol.* 89(9):925-932; 1975.

The clinical findings in 18 children in whom deafness was related to a period of neonatal jaundice are presented. There were 16 boys and 2 girls. The jaundice was due to Rh incompatability in 16 cases and to ABO incompatability in 1 case; in the remaining patient, deafness followed the occurrence of maternal jaundice of unknown etiology 2 days before the onset of labor. Ten patients had a sudden hearing loss at 1,000 cycles per second (cps). Three cases had a U-shaped curve on the audiogram (hearing loss in decibels plotted against cps), with a maximal loss at 2,000 cps and some recovery at very high tones. Two patients had a flat audiogram, and the remaining three patients were so mentally backward that thresholds could only be obtained with evoked response audiometry. A mean audiogram was produced by averaging the hearing thresholds at various frequencies of 15 patients in whom accurate thresholds could be determined. This curve showed the plateau of hearing up to 1,000 cps, with the abrupt loss above this level. Only three cases heard above 2,000 cps, which could be a reflection of the degree of involvement of the dorsal and ventral cochlear nuclei. The author concludes that the degree to which the phylogenetically older low tone hearing pathway (ventral cochlear nucleus) is affected is directly related to the severity of the jaundice.

8950 INHERITABLE DISORDERS OF BILIRUBIN METABOLISM. (Eng.) Israel, J. B.; Arias, I. M (Albert Einstein Coll. Medicine, Bronx, NY). *Adv. Intern. Med.* 21:77-96; 1976.

8951 EFFECTS OF CARBOHYDRATE AND LIPID FEEDING ON THE PLASMA BILIRUBIN CONCENTRATION IN GILBERT'S SYNDROME [Abstract]. (Eng.) Gollan, J. L.; Bateman, E. C.; Billing, B. H. (Royal Free Hosp London, England). *Digestion* 12(4/6):256; 1975.

See also, 8881, 8895.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

8952 AFLATOXIN-POSSIBLE FACTOR OF LIVER DAMAGE IN CHILDREN. (Cze.) Dvorackova, I.; Brodsky, F.; Cerman, J. (Ustav patologicke anatomie, 500 36 Hradec Kralove, Czechoslovakia). *Cesk. Hyg.* 19(4):211-216; 1974.

Seven cases of fatal illness in children aged 3 days to 22 months were observed. In two cases, the illness had a clinical picture of an acute encephalitic syndrome, and in four cases, the course of the disease was prolonged, but the clinical symptoms were similar. The main morphological finding was brain edema and steatosis. In prolonged cases, the liver showed, together with steatosis, chronic changes (periportal and perilobular fibrosis and in one case, cirrhosis). Bacteriological and virological examinations were negative. A substance whose qualities corresponded to those of aflatoxin B_1 was chromatographically detected in the livers of the dead children. Only one similar report has been published. Very little is known about the effects of aflatoxin on humans, and published data concern cases observed in the tropics. Our observations indicate that even under temperate conditions, aflatoxin may be an etiological factor in some cases of liver damage, especially in children. It is not clear whether the intoxication occurs pre- or postnatally. The mother of two of the infants worked at a poultry selection center during both pregnancies and was probably in contact with alfatoxin-contaminated feeds. The toxin may have been transmitted to the children prenatally or in the mother's milk after birth. The proven occurrence o aflatoxin in the milk of cows given contaminated feed suggests the latter hypothesis, although in one of the cases, aflatoxin was present in the liver of a 3-day-old boy born prematurely.

8953 UNEXPLAINED JAUNDICE FOLLOWING NON-HALOTHANE ANAESTHESIA: A CASE REPORT. (Eng. Hart, S. M.; Fitzgerald, P. G. (St. Finbarr's Hosp. Douglas Rd., Cork, Ireland). *Br. J. Anaesth.* 47(12 1321-1326; 1975.

The case of a 62-yr-old man who developed unexplaine jaundice following the repeated administration of non-halothane anesthesia is presented. The patient had undergone amputation of the right leg for acute claudication 3 yr previously and presented with a gangrenous ulceration of the left hallux. He receiv atropine (0.5 mg, i.v.) and anesthesia (200 mg thiopentone followed by 75 mg suxamethonium chloride via endotracheal intubation) prior to an unsuccessful femoral angiogram. Anesthesia was maintained with nitrous oxide (8 l/min) and oxygen (4 l/min) delivered from a Boyle's apparatus fitted with a halothane vaporizer and a methoxyflurane vaporizer. A further 225 mg of suxamethonium chloride was given. The patient's fever persisted for 6 days, during

ich time he complained of nausea and upper abdomi-
l discomfort. Four days after his temperature
d returned to normal, a translumbar aortogram
sing sodium iothalamate) was carried out under
uroleptanalgesia with droperidol (7.5 mg) and
enoperidene (0.75 mg). After the procedure, the
tient again developed pyrexia; cephalothin, which
d been administered since the development of py-
xia after the first procedure, was continued. A
itti-Stokes amputation was performed for extensive
sease in the leg. For this operation, the patient
ceived atropine, thiopentone, suxamethonium chlo-
de, pancuronium nitrous oxide, and oxygen. Anes-
esia was supplemented with droperidol and fentanyl.
e neuromuscular block was antagonized by neostig-
ne preceded by atropine. The patient's tempera-
re increased, and he became jaundiced and confused
the 8th day after operation. Total bilirubin,
kaline phosphatase, SGOT, LDH, and SGPT levels
re all elevated. Hepatitis B antigen was not de-
cted. There was an increased γ-globulin fraction
the plasma proteins. The jaundice disappeared
adually over about 6 days, and pyrexia disappeared
a further 7 days; the liver function tests were
rmal 29 days after operation. Although halothane
s not administered in this patient, his symptoms
re similar to those in post-halothane jaundice.
e possible reasons for his jaundice include: leak-
e of halothane from the halothane vaporizer tubes,
e presence of sepsis, or the competition of methyl-
pa and the anesthetic drugs for the same micro-
mal enzymes involved in biotransformation.

54 LIVER INJURY CAUSED BY N-PROPYLAJMALINE BITARTRATE.

(Ger.) Henning, H.; Vogel,
-M.; Ihlenfeld, J.; Buchegger, K.; Luders, C. J.
linik Fohrenkamp BfA, 2410 Molln/Lauenburg,
stfach 13 80, W. Germany). *Z. Gastroenterol.* 13
):501-506; 1975.

o case reports of prajmaline management of toxic
allergic hepatitis are presented. A 47-yr-old
man under prajmaline treatment for arrhythmia
r 1 week presented with fever, icterus of skin
d conjunctiva, anorexia, and nausea. Diagnosis
s cholangitis with slight cholestasis and fatty
ver. Under suspicion of prajmaline-induced liver
mage, a challenge of 20 mg prajmaline was given
two successive days. A 3% eosinophilia and
nspicuous elevation of alkaline phosphatase, GLDH,
T, and GPT occurred within 24 hr. A 49-yr-old
man received prajmaline for management of extra-
stoles; GOT and GPT increases had not been in
idence after administration of other antiarrhyth-
c agents. Further tests with three doses of 20
prajmaline also showed biochemical profiles
pical of liver injury. Histology found edematous
rtal fields with fibrosis, lymphocytic infiltrates,
ominent eosinophilia, hypertrophy of intrahepatic
cts, and fatty vacuolization. Paraclinical
riables were normalized 15 days later, without
erapy. In a subsequent screening study, 4 of 27
tients on prajmaline also presented with elevated
rum enzymes. The medication history of patients
th suspected chronic active hepatitis should be
plored.

8955 LIVER DISEASE IN POLYVINYL CHLORIDE PRODUCTION WORKERS—CLINICAL AND LAPAROSCOPIC ASPECTS.

(Ger.) Marsteller, H. J.; Lelbach, W. K.; Muller, R.; Gedigk, P.; Lange, C. E. (Medizinische Universitatsklinik, D-5300 Bonn-Venusberg, W. Germany). *Leber Magen Darm* 5(5):196-202; 1975.

The clinical findings, laparoscopic data, and histology of liver damage in 44 employees of polyvinyl chloride manufacturing plants are discussed. The liver was palpable in 16 of 44, and there was a nodular or granulated liver surface in 25 of 44. Portal fibrosis was conspicuous in 25, most of it reticular, with septal invasion. Increased vascularization occurred in 20 workers; only 7 had frank portal hypertension. BSP retention was elevated in 34 (45-min mean of 10.5%), and 12 had a low-grade hyperbilirubinemia. SGOT increased transiently in 12 employees, SGPT in 13, and alkaline phosphatase in 8. Esophageal or fundic varices were found in 10 subjects. Thrombocytopenia, often with platelet dysfunction, was marked in 40 patients. Histologically, focal degeneration in hepatocytes, nuclear polymorphy or polyploidy, septal fibrosis, reticular collagenization, and sinusoidal cell proliferation were the predominant findings.

8956 MORPHOLOGICAL CHANGES OF THE LIVER AFTER CHRONIC VINYL CHLORIDE INTOXICATION.

(Ger.) Muller, R.; Bechtelsheimer, H.; Gedigk, P.; Marsteller, H. J.; Lelbach, W. K. (Pathologisches Institut der Universitat, D-5300 Bonn-Venusberg, W. Germany). *Leber Magen Darm* 5(5):204-208; 1975.

The liver biopsy results for 50 patients who had worked in polyvinyl chloride (PVC)-manufacturing plants are generalized. Necroses in cell assemblies were not found, but individual hepatocytes were hypertrophic and necrotic. About half the parenchymal cells showed some degree of fatty degeneration. The more recent the exposure, the more marked were the changes. Synchronous adaptation, chiefly milk-glass cytoplasm, was conspicuous. Hyperplasia also occurred, but it could not be related to exposure time; it was especially pronounced around the dilated sinusoids. There was either septal fibrosis of the portal fields or, more frequently, centrolobular collagenization of the sinusoid walls. The perisinusoidal collagen deposition did not resemble that of sclerosing hyaline necrosis or chronic hepatitis. The degree of fibrosis and collagenization varied directly with total exposure time. The most marked changes occurred in the sinusoidal cells. Nuclear modification was apparent in the larger lining cells after a 1-yr exposure. After 6-10 yr, there was chain proliferation of the lining cells, with increasing nuclear polymorphy. Hemangioendothelial sarcomas were found in 3 of 50 cases. The tumors extended along the sinusoids into the parenchyma, often polycentrically. There was a strong indication of transitional cell types between the atypical sinusoidal cells and tumor cells at the growing edges of the sarcoma. Individually, these cell alterations were nonspecific, but the combination might represent a specific VC syndrome.

8957 DOES SERUM HIGH-DENSITY LIPOPROTEIN (HDL) CONTENT CORRELATE WITH LIVER DAMAGE [Abstract]. (Eng.) von Lehmann, B.; Grajewski, O.; Oberdisse, E.; Arntz, H.-R. (Pharmakologisches Institut der Freien Universitat Berlin, Berlin, E. Germany). *Digestion* 12(4/6):324; 1975.

8958 ELECTRON MICROSCOPIC STUDY ON THE INJURIOUS EFFECTS OF CHLORPROMAZINE ON RAT LIVER CELLS. (Eng.) Balazs, M.; Juhazs, J. (Dept. Pathology, Janos Korhaza, Diosarok ut 1, 1125 Budapest XI, Hungary). *Exp. Pathol. (Jena)* 11(1/2):25-37; 1975.

8959 STUDIES ON HEMORRHAGIC HEPATITIS OF MICE INDUCED BY COMBINED TREATMENT WITH ε-AMINO-TRIMETHYL LYSINE AND D-GALACTOSAMINE [Abstract]. (Eng.) Lapis, K.; Tompa, A.; Szendo, B. (Semmelweis Medical Univ., Budapest, Hungary). *Digestion* 12(4/6):323; 1975.

8960 CHANGES IN KIDNEY AND LIVER FUNCTION AFTER METHOXYFLURANE (PENTHRANE) ANAESTHESIA. (Eng.) Dahlgren, B.-E.; Goodrich, B. H. (Dept. Anesthesiology, Linkoping Univ., Linkoping, Sweden). *Br. J. Anaesthiol.* 48(2):145-149; 1975.

8961 CELL-MEDIATED IMMUNITY TO OXYPHENISATIN IN PATIENTS WITH OXYPHENISATIN-INDUCED LIVER DISEASES [Abstract]? (Eng.) Nielson, J. O.; Andersen, V.; Dietrichson, O.; Juhl, E.; Thomsen, M. (Blegdam Hosp., Copenhagen, Denmark). *Digestion* 12(4/6):334; 1975.

8962 CONTROLLED TRIAL OF CYSTEAMINE AND DIMERCAPROL IN THE PREVENTION OF LIVER DAMAGE AFTER PARACETAMOL OVERDOSE [Abstract]. (Eng.) Gazzard, B. G.; Hughes, R. D.; Chhibber, A. D.; Bennett, J. R.; Murray-Lyon, I. M.; Dordoni, B.; Williams, R. (King's Coll. Hosp., London, England). *Gut* 16(10):839; 1975.

8963 CLINICAL IMPLICATIONS OF SALICYLATE-INDUCED LIVER DAMAGE. (Eng.) Levy, G.; Yaffe, S. J. (Children's Hosp., Buffalo, NY 14222). *Am. J. Dis. Child.* 129(12):1385-1386; 1975.

8964 LIVER DAMAGE AFTER SULFAMETHOXAZOLE-TRIMETHOPRIM (BACTRIM, TRISURAL). (Dan.) Hermansen, K.; Baunsgaard, P.; Heydenreich, G.; Nielsen, G. (Odense sygehus, medicinsk afdeling C, patologisk institut, Odense, Denmark). *Ugeskr. Laeger* 138(7):422-424; 1976.

8965 PRE-SYMPTOMATIC DETECTION OF LIVER CHANG IN VINYL CHLORIDE MONOMER WORKERS [Abstract]. (Eng.) Williams, D. M. J.; Taylor, K. J. W.; Crossley, I. R.; Smith, P. M.; Duck, B. W. (British Petroleum Chemicals Intl. Ltd., Penarth, England). *Digestion* 12(4/6):362; 1975.

8966 NEONATAL HEPATITIS. (Eng.) Bender, S. von Loewenich, V.; Hubner, K. (Universitskliniken, D-6000 Frankfurt/Main, Theodor-Storm-Ka 7, Germany). *Monatschr. Kinderheilk.* 123(8):621-6 1975.

8967 A REFRACTORY CASE OF HEPATIC AMOEBIASIS. (Eng.) Gregory, P. B. (Stanford Univ. S Medicine, Room S 069, Stanford, CA 94305). *Gastroenterology* 70(4):585-588; 1976.

8968 ACUTE LIVER INJURY IN RATS BY PRASEODYMI NITRATE. (Ger.) Schriewer, H.; Gebauer B.; Rauen, H. M. (Westfalische Wilhelms-Universita Waldeyerstr. 15,44 Munster, W. Germany). *Arzneim. Forsch.* 26(3):399-402; 1976.

See also, 8511.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

8969 ETIOLOGICAL SPECTRUM OF POST-TRANSFUSION HEPATITIS. (Eng.) Knodell, R. G.; Conrad, M. E.; Dienstag, J. L.; Bell, C. J. (Div. Hematology/Oncology, Univ. Alabama, Birmingham, AL 35204). *Gastroenterology* 69(6):1278-1285; 1975.

Preoperative, acute, and convalescent sera were screened for evidence of hepatitis B and A virus, Epstein Barr virus (EBV), and cytomegalovirus (CMV exposure in 34 cardiac surgery patients developing post-transfusion hepatitis postoperatively and 20 randomly selected patients. Four hepatitis patien showed evidence of hepatitis B infection and three non-B hepatitis patients developed significant antibody titer rises to CMV. The blood transfusio requirement for these patients was significantly

ter than that required for either the remaining
titis patients or the nonhepatitis group
.001). No patient showed evidence of acute
titis A infection postoperatively in response
lood transfusions. EBV was not responsible for
cases of post-transfusion hepatitis. Laboratory
s defined a probable etiology in only 7 of 34
s and failed to implicate hepatitis A, EBV, or
in the majority of the non-B post-transfusion
titis cases. This suggests that identification
characterization of additional hepatitis-produc-
agents will be required to define further the
emiology of post-transfusion hepatitis and to
lop measures for its prevention.

CLINICAL, BIOCHEMICAL AND HISTOMORPHOLOGI-
CAL STATE OF THE LIVER IN 203 SUBJECTS CURED
CUTE VIRAL HEPATITIS. (Cro.) Kaljalovic, R.;
, M.; Bojanic, N.; Tasic, B. (Institut za Patolo-
i Sudsku Medicinu, Yugoslavia). *Zb. Vojnomed.*
33-37; 1974.

ical, biochemical, and histomorphological changes
he liver of patients cured of acute viral hepa-
is were studied; 203 men had suffered from acute
l hepatitis for 6 months to 15 yr prior to
study. A normal liver was found in 139 men
were examined histologically, even though some
physical changes (subicterus and enlarged liver
spleen), as well as changes in liver function
ts. Chronic persistent hepatitis was found
28 patients, and 2 men had chronic acute hepa-
is. Liver cirrhosis was found in 2 patients,
le 28 men had small residual histomorphological
nges of the liver. The changes were most often
the form of mild periportal liver infiltration.
re was no correlation between the clinical and
medical findings and histomorphological changes.

1 ACUTE AND CHRONIC HEPATITIS. (PART I).
(Ger.) Affolter, H.; Allemann, U.; Raber,
(Medizinische Abteilung, St.-Clara-Spital, 4058
l, Switzerland). *Praxis* 64(30):949-957; 1975.

current status of hepatitis B Australia antigen
sAg) and its role in acute viral hepatitis are
iewed. A group of 68 patients with acute viral
atitis (AVH) was 40% positive for HBsAg. In hepa-
is B serum, HBsAg is detectable 1-4 weeks before
clinical signs and remains 4-6 weeks after clini-
onset. The prodromal phase lasts 1-2 weeks before
onset of icterus and is characterized by nausea,
er, and arthralgia. The icteric phase begins
days after the first phase, and its clinical
ression results from direct hepatocyte insult.
nsaminase elevation begins 2 months after paren-
al and 3 months after oral infection; alkaline
sphatase is increased only in cholestatic involve-
t. Fulminating infection is indicated by sharp
irubin increases, sudden transaminase decreases,
a reduction in clotting factors II, V, and VII.
HBsAg remains elevated after AVH subsides in 3
ths, a transition to chronic hepatitis usually
urs. Antibiotics, vitamins, the flavonoid cya-
amol, and dietary intervention are without effect.
Corticosteriods should never be administered in uncomplicated disease, since they influence neither the degree of liver necrosis nor healing; they are associated with more complications and higher recurrence rates. The author recommends prednisolone (40-60 mg/day) only in refractory AVH. Mortality is about 1%. Of 52 of 68 patients followed, 5 developed chronic hepatitis, 2 developed active hepatitis, and 3 developed persistent chronic hepatitis. Prophylaxis with hyperimmune sera is recommended.

8972 ISOLATION AND CHARACTERIZATION OF HEPATITIS A VIRUS. (Eng.) Bradley, D. W.; Hollinger, F. B.; Hornbeck, C. L.; Maynard, J. E. (Phoenix Lab. Div., Public Health Service, Dept. Health, Education, Welfare, Phoenix, AZ). *Am. J. Clin. Pathol.* 65(5):876-889; 1976.

Current isolation techniques of hepatitis A virus (HAV) from human and chimpanzee stool, liver, and bile specimens, as well as comparative characterizations of HAV buoyant density properties of human and chimpanzee stool-derived particles are reviewed. Methods designed for the extraction and purification of HAV from large samples of stool and liver tissues are discussed in detail. Pooled stool suspended in water, veal infusion broth, and bovine serum albumin is stirred at 25 C, freeze-thawed four times, centrifuged once at 1,000 x *g*, centrifuged twice at 12,000 x *g*, and passed through a membrane filter of 0.45 μm pore size; the filtrate is concentrated sevenfold in an Amicon TCF-10 ultrafiltration system, dialyzed twice, and examined by immunoelectronmicroscopy. Immunoelectronmicroscopy of gradient fractions of HAV from human stool prepared on a five-step, discontinuous CsCl gradient revealed that the bulk of the HAV particles band in fractions with buoyant densities of 1.22-1.47; this suggests that the HAV particles belong to the enterovirus group. Passage and subpassage of human-derived stool suspension in chimpanzees markedly altered the apparent banding properties of the HAV particles on CsCl gradients. The finding of bimodal distributions of HAV particles in CsCl gradients for chimpanzee-derived samples may reflect the influence of the host's gut environment on the buoyant densities of the HAV particles. Immunoelectronmicroscopy and radioimmunoassay of bile collected both from the gallbladder and by T-tube cannulation of the common bile duct in chimpanzees revealed the presence of HAV. Two methods have been used for the extraction of HAV from infected chimpanzee liver tissue: high-speed homogenization of the tissue in a biocontained Omni-Mixer chamber, using phosphate-buffered saline of 1% in Triton X-100, followed by differential centrifugation of the homogenized material; and an aluminum oxide grinding procedure, also with 1% Triton X-100. A radioimmunoassay comparison of the two procedures revealed that the latter procedure yielded about five times more antigenic material than the former method. Purification of HAV from stool filtrates by polyethylene glycol precipitation and Sepharose 2B gel filtration yielded a significantly greater degree of purification than that obtainable by isopycnic banding of the preparation in CsCl. Sepharose gel filtration of liver extract did not result in extensive purification of HAV antigen activity, indicating that other techniques are needed to purify HAV from infected liver tissue.

8973 COAGULATION FACTORS IN THE DEVELOPMENT OF COMMON VIRUS HEPATITIS.

(Fre.) Thabaut, A.; Laverdant, Ch.; Durosoir, J.-L.; Voinesson, A.; Cristau, P.; Essioux, H.; Molinie, Cl.; Allard, P.; Roue, R. (Hopital d'Instruction des Armees Begin, F 94160 Saint-Mande, France). *Ann. Med. Interne (Paris)* 126(10):639-648; 1975.

A systematic study of coagulation variables in viral hepatitis patients is reported. The clinical sample included 104 subjects 18-25 yr of age. All had evolved toward normalization, 80 monophasically and 24 polyphasically (with rebound). Assay was also made of 100 healthy persons of equivalent age and 31 patients with alcoholic cirrhosis. Total plasma coagulability, as measured by cephalin-kaolin time, was maximal at the onset of hepatitis and persisted up to week 7, regressing only gradually thereafter. The prothrombin time was not significantly lower at the onset of the disease, and it returned to normal at the end of week 1. Factor VIII remained significantly elevated over control levels through week 2, reaching its maximum at the onset of hepatitis. Factor IX levels were insignificantly lower throughout. Thrombin time was higher in the hepatitis group up to week 5; its maximum was at the onset of disease. Fibrinogen levels were insignificantly lower among the cirrhotics and insignificantly higher in the hepatitis patients for 1 week, after which they declined to significantly lower levels by week 3. Factor XIII was the same in all subject groups. There was no evidence of arrested fibrinolysis in the hepatitis patients. Proactivator rates were reduced in the cirrhotics only at the onset of disease; they returned to normal in week 1. Plasminogen was also lower in the cirrhotics, but it was unaltered in the hepatitis patients. Antithrombin III was reduced among the cirrhotics and slightly elevated in the hepatitis group. There was no difference in any factor between the monophasic and polyphasic groups. Photometric assay showed a significant difference between the affected and healthy subjects in fibrin formation, suggesting defective polymerization of fibrin monomers.

8974 ROLE OF HBsAb IN DEVELOPMENT OF HEPATITIS.

(Eng.) Gomez de la Concha, E.; Hernandez-Guio, C.; Ortiz, F.; Hernando, L. (Fundacion Jimenez Diaz, Ave. Reyes, Catolicos 2, Madrid, 3, Spain). *Lancet* 2(7929):304-306; 1975.

To clarify the relation between the antibody to hepatitis B surface antigen (HBsAb) and the development of hepatitis in carriers of hepatitis B surface antigen (HBsAg), a sensitive passive hemagglutination assay was used to test for HBsAb. Sera of 45 healthy controls, 20 patients with acute type-B hepatitis, 32 household contacts of 14 HBsAg carriers, 31 hospital staff members working in high risk areas for acquiring HBsAg, 92 commercial blood donors whose sera were HBsAg-negative, 31 patients with chronic renal
failure, 66 patients with chronic hepatitis or l
cirrhosis, and 21 asymptomatic HBsAg carriers we
tested. HBsAb was found significantly less ofte
in the asymptomatic HBsAg carriers (24%) than in
HBsAg carriers with liver disease (60%, p<0.025)
Among the asymptomatic HBsAg carriers, all of th
five patients who had HBsAb had elevated SGOT va
ues, compared with only 6 of the 16 without anti
(p<0.01). Following an outbreak of type-B hepat
in 10 of a group of 41 patients and staff member
previously tested for HBsAb, it was found that h
titis had occurred in 7 of 18 patients who had n
had HBsAb and in only 3 of 23 patients who had p
existing antibody. This difference was even mor
significant when those individuals with antibody
titers of 1/27 or higher were compared with thos
whose titers were lower than 1/27. Of the 10 in
dividuals who developed hepatitis, only two beca
negative for HBsAg and had normal liver function
tests within 11 months after the appearance of s
toms. Among 20 patients with acute type B hepat
and no renal insufficiency or immunological dysf
tion, liver function tests returned to normal, a
HBsAg disappeared from the serum in all but one
tient within 11 weeks. These data suggest that
B hepatitis is endemic in the general population
Spain, and that immune response to HBsAg may be
essary for the prevention of the development of
liver damage in this disease. A good antibody r
sponse to HBsAg was found, however, in uremic pa
tients with hepatitis. It appears, therefore, t
immune mechanisms other than the humoral respons
may account for the pathogenesis of this disease

8975 IMMUNE REACTIONS TO HBsAg, HBcAg AND " ANTIGEN IN ACUTE VIRAL HEPATITIS AND I HBsAg CARRIERS WITH NORMAL AND PATHOLOGICAL LIVE

(Ger.) Meyer zum Buschenfelde, K. H.; Arnold,
Knolle, J.; Hess, G. (II. Med. Univ.-Klinik, La
beckstrasse, D-6500 Mainz, W. Germany). *Z. Gast
enterol.* 14(3):365-377; 1976.

Studies of the temporal relation between humoral
cellular immunity against hepatitis B (HB) antig
and the simultaneous behavior of HB surface anti
(HBsAg), HB core antigen (HBcAg), and e-antigen
serum or tissue were undertaken in patients with
viral hepatitis and in HBsAg carriers with and
liver disease. Clinical samples included 22 HBs
carriers with normal livers (group A), 13 patie
with acute viral hepatitis (group B), 6 patients
acute nonviral hepatitis (group C), and 12 HBsA
tive patients with chronic active hepatitis (gr
Only five patients in group A showed inhibition
stimulation in the presence of HBsAg; cell medi
immunity against human liver specific membrane
(HLMP) was present in two patients. Cell media
immunity against antinuclear, antimitochondrial
smooth muscle, and liver cell membrane antigen
antibodies did not occur. Antibodies to HBsAg
HBs) were not detected, but antibodies to HBcAg
HBc) were found in 10 of 10 and anti-e in 6 of
HBsAg, but not HBcAg, was demonstrated in hepat
cytoplasm in 16 cases. In group B, 12 cases sh
cell mediated immunity against HBsAg, although
HBsAg was radioimmunologically negative and no

ntibodies to the antigen 4-6 weeks after the
of disease. In 4-6 months, cell mediated
ity decreased and anti-HBsAg increased. A
ity of patients showed a constant immunity to
for several weeks of the disease. Anti-e and
igen were not found. In group C, antibodies to
and cell mediated immunity were absent. In
D, nine patients showed a cell mediated immunity
st HBsAg and HLMP for at least 18 months. HBcAg
nti-HBc were found in the nuclei of isolated
ocytes in all patients. The findings indicate
the immune reaction against virus, viral antigen,
irus-infected cell represents the pathogenetic
r of acute and chronic liver involvement, rather
hepatitis-B-virus itself.

A DOUBLE-BLIND TRIAL OF (+)-CYANIDANOL-3 IN VIRAL HEPATITIS. (Eng.) Berengo, A.;
ito, R. *In: New Trends in the Therapy of Liver*
ses. Proceedings of the International Symposium
Trends in the Therapy of Liver Diseases, Tir-
, *June 6-7, 1974.* Bertelli, A., ed. (New York:
ger): pp. 182-190; 1975.

le-blind trial of (+)-cyanidanol-3 for the
ent of viral hepatitis was performed with 117
ts, 56 of whom received 1.5 g/day of the drug,
of whom received a placebo for 40 days. No
icant differences were noted in either the dura-
f illness or convalescence between the two
. The drug caused a 15% more rapid decrease
al serum bilirubin in the treated patients.
nical, biochemical, or hematological side-
s were noted.

CHOLESTASIS DURING VIRUS HEPATITIS. (Fre.) Albot, G.; Toulet, J. (Centre de
enterologie de la Clinique Chirurgicale l'Hotel-
1, place du Parvis Notre-Dame, 75004 Paris,
). *Sem. Hop. Paris* 50(46):2853-2865; 1974.

rieties of cholestatic expression during viral
tis are reviewed. The initial cholestatiform
transient cholestatic episodes during the
al period and in persistent hepatitis, choles-
rm and cholestatic viral hepatitis, and the
viral and drug-induced etiology of cholestati-
epatitis are examined. Cholestatiform involve-
efers to cholestasis superposed on syndromes
enchymal or mesenchymal hepatitis and cytoly-
It occurs in the first few days of icterus and
etimes prolonged to the 9th or 10th day,
earing by the 12th. The short duration,
e of acute ductal change, early onset of
rative hepatocyte modification, and involve-
f the Golgi apparatus suggest abnormalities
atocyte transit and elimination of conjugated
in. The transient cholestatic episodes are
erized by piecemeal zones of hepatocyte
cation, small-ductule necroses, and low hepa-
glycogen. Special attention is given to the
f a cholestatic syndrome associated with
ymal and mesenchymal hepatitis and cytolysis
chlorpromazine management. A competitive phenomenon between chlorpromazine and viral infection is proposed, which would explain the icterus and the frequency of cholestatiform occurrences.

8978 STUDY OF CARBOHYDRATE METABOLISM IN LIVER DISEASE. FIRST REPORT: STUDY OF GALACTOSE TOLERANCE TEST [Abstract]. (Eng.) Shibata, H.; Yajima, Y.; Toyama, K. (Kitasato Univ., Sch. Medicine, Sagamihara, Kanagawa, Japan). *Jpn. J. Med.* 14(2):134; 1975.

8979 SOME ULTRASTRUCTURAL ASPECTS OF LYMPH-NODE CELLS AND HEPATOCYTES IN PAPULAR ACRODERMATITIS OF CHILDHOOD. (Eng.) Gianotti, F.; Caputo, R. (Clinic Dermatology, Univ. Milan, Milan, Italy). *J. Cutaneous Pathol.* 2(2):97-102, 1975.

8980 DETECTION OF HEPATITIS-B SURFACE ANTIGEN IN PLASMA SAMPLES BY REVERSED PASSIVE HAEMAGGLUTINATION TESTS. (Eng.) Combridge, B. S.; Kennedy, B. J. (Blood Products Lab., Lister Inst. Preventive Medicine, Elstree, Herts, England). *Vox Sang.* 31(1):32-36; 1976.

8981 RECENT ADVANCES IN VIRAL HEPATITIS: PART II. (Eng.) Melnick, J. L.; Hollinger, F. B.; Dreesman, G. R. (Baylor Coll. Medicine, Houston, TX 77030). *South. Med. J.* 69(5):634-641; 1976.

8982 ACUTE VIRAL HEPATITIS IN ITALY: A MULTICENTRIC STUDY [Abstract]. (Eng.) Giusti, G.; Galanti, B.; Piccinino, F.; Ruggiero, G.; Lucchelli, P. E.; Arcuri, F.; Arena, F.; *et al* (No affiliation given). *Digestion* 12(4/6):269-270; 1975.

8983 THE PREVALENCE OF HEPATITIS-B ANTIGEN (HBsAg) AND ITS ANTIBODY (ANTI-HBs) AMONG LONDON HEMOPHILIACS AND BLOOD DONORS FROM LONDON AND TWO TROPICAL AREAS. (Eng.) Islam, M. N.; Banatvala, J. E. (St. Thomas' Hosp., London SE1 7EH, England). *Transfusion* 16(3):237-241; 1976.

8984 SOME ASPECTS OF HB Ag IN HEPATITIS IN SRI LANKA. (Eng.) Nagaratnam, N.; Vitarana, U. T.; Alagaratnam, K.; Thambapillai, A. J.; Fernando, D. C. R. (General Hosp., Colombo, Sri Lanka). *Trop. Geogr. Med.* 27(2):177-180; 1975.

8985 INCIDENCE AND DISTRIBUTION OF HEPATITIS B_S-ANTIGEN IN TURKEY. (Eng.) Pirnar, A.; Kanra, T. (Hacettepe Medical Sch., Hacettepe Univ., Ankara, Turkey). *Vox Sang.* 31(1):67-69; 1976.

8986 SERUM LIPOPROTEIN PROFILE IN INFECTIOUS HEPATITIS. (Eng.) Devi, C. S.; Bhoopal, V. V.; Swamy, B.; Satyavani, B.; Reddy, C. R. R. M. (Andhra Medical Coll., Visakhapatnam [A.P.], India). *Jpn. J. Exp. Med.* 46(1):15-18; 1976.

8987 EARLY ANTIBODY RESPONSES AND CLINICAL COURSE IN POST-TRANSFUSION HEPATITIS [Ab stract]. (Eng.) Yamamoto, S.; Monna, T.; Kobayas K.; Uchida, H.; Mori, T.; Ono, T.; Okamoto, N.; *et al* (Osaka City Univ. Medical Sch., Osaka City, Japan). *Jpn. J. Med.* 14(2):128-129; 1975.

See also, 8534, 8639, 8665, 8670, 8671, 8884, 892
8997, 9039, 9044, 9088, 9097, 9131, 913

LIVER AND BILIARY TRACT

Chronic Hepatitis

8988 BIOCHEMICAL FEATURES OF ACUTE AND CHRONIC HEPATITIS. (Eng.) Skrede, S.; Blomhoff, J. P.; Gjone, E. (Inst. Clinical Biochemistry, Rikshospitalet, Oslo, Norway). *Ann. Clin. Res.* 8(3): 182-199; 1976.

The authors' experience with biochemical tests in acute and chronic hepatitis is reviewed, and the differential diagnosis of these diseases from other liver diseases is discussed. Serum alanine aminotransferase (ALAT) and aspartate dehydrogenase (ASAP) levels have been found to be increased in most patients with acute viral hepatitis, acute alcoholic hepatitis, active chronic hepatitis, chronic persistent hepatitis, and primary biliary cirrhosis. The ASAT/ALAT ratio was increased in 40% of patients with acute alcoholic hepatitis, 7% of patients with active chronic hepatitis, 6% of patients with primary biliary cirrhosis, 23% of patients with cryptogenic cirrhosis, and 59% of patients with alcoholic cirrhosis; this ratio was lowered in 32% of patients with acute viral hepatitis. The ornithine carbamyl transferase level (OCT) was raised in all patients with acute viral hepatitis, acute alcoholic hepatitis, chronic active hepatitis, chronic persistent hepatitis, and primary biliary cirrhosis. The transaminase levels were raised in all patients with acute alcoholic hepatitis, alcoholic cirrhosis, and alcoholic steatosis and in 93%, 96%, 70%, 95%, and 79% of patients with acute viral hepatitis, chronic active hepatitis, chronic persistent hepatitis, primary biliary cirrhosis, and cryptogenic cirrhosis, resp. Alkaline phosphatase was increased in 80%, 80%, 66%, 50%, 95%, 57%, 73%, and 28% of the patients with acute viral hepatitis, acute alcoholic hepatitis, chronic active hepatitis, chronic persistent hepatitis, primary biliary cirrhosis, cryptogenic cirrhosis, alcohol cirrhosis, and alcoholic steatosis, resp. In mos patients with acute or chronic hepatitis, the pre bumin and coagulation factor concentrations are l ered; the haptoglobin and complement C3 concentra tions are also frequently lowered. Increased tot cholesterol concentrations and free cholesterol, increased phospholipids and/or the presence of l protein X (LP-X) strongly suggest cholestasis, w as low total cholesterol concentrations, togethe with a relative increase of free cholesterol in plasma without the presence of LP-X, suggest par chymatous liver disease. An increase in immunog bulins belonging to a particular class is not di nostic of any particular liver disorder. Howeve the immunoglobulin G concentrations were often h in chronic active hepatitis. Smooth muscle anti bodies and antinuclear factors are most frequent elevated in chronic hepatitis. Quantitative tes of liver function, biochemical tests in the clas ation of liver disease, and test batteries in li diseases are discussed.

8989 RHEOLOGICAL INVESTIGATIONS IN CHRONIC ACTIVE HEPATITIS. (Ger.) Leonhardt, Bungert, H.-J. (Klinikum Steglitz, Freie Univers tat Berlin, D-1000 Berlin 45, Hindenburgdamm 30, W. Germany). *Z. Gastroenterol.* 13(6):588-593; 1

Plasma and whole blood viscosities in cases of a hepatitis (ACH) under corticoid management are c lated with laboratory data. The clinical sample cluded 12 type IIB and 5 type IIA patients witho

or therapy. Fluocortolone treatment (60 mg on day
40 mg on day 2, and 20 mg daily thereafter for 4
ks) was begun. The maintenance dose was 15-20
daily, depending on transaminase levels. Micro-
cosimetric and serum values were compared with
se in 20 normal patients without treatment. Pre-
atment plasma viscosity was significantly higher
the patient group, and correlated with immuno-
oulin G (IgG). The highest whole blood and
sma viscosity values and the most prominent
er dysfunction levels were almost exclusively
nd in type IIB disease (transaminase above 40 IU/
and hypergammaglobulinemia). After 4 weeks of
ocortolone, plasma viscosity was normal and the
m hepatic variables and whole blood viscosity
roved, with a significant correlation to dec-
ed IgG. Arterial ammonia occurred in only one
ent, and a positive normotest was found in two
ents. Hyperviscosity, which is attributed to
ated IgG, reduces the hepatic circulation and
equent oxygenation and leads to the typical
s of parenchymatous and stromal inflammation.

THE SERUM PROTEIN PROFILE IN CHRONIC HEPATITIS, CIRRHOSIS, AND LIVER CANCER. (Eng.)

matsu, S.; Kojima, J.; Okada, T. T.; Inai, S.;
ri, K. (Center for Adult Diseases Osaka, 3-
michi 1-Chome, Higashinari-ku, Osaka 537, Japan).
Hepatogastroenterol. 23(3):177-182; 1976.

larify the serum protein profile in liver dis-
s, the serum levels of immunoglobulin G (IgG),
IgM, transferrin, haptoglobin, α2-macroglobulin
, α1-antitrypsin (1AT), and α1-acid glycoprotein
) were determined by a single radial immunodif-
on method. One hundred and sixty healthy men, 38
ents with chronic active hepatitis, 30 patients
chronic inactive hepatitis, 30 patients with
ient cirrhosis, 40 patients with cirrhosis,
30 patients with primary liver cancer were tested.
ean levels of the three immunoglobulins and of
all liver diseases were significantly higher
those in the healthy subjects. The mean levels of
ere 1,347, 2,113, 1,652, 1,760, 2,116, and 1,888
in the healthy subjects, chronic active hepa-
, chronic inactive hepatitis, incipient cirrho-
cirrhosis, and primary liver cancer patients,
; the IgA levels were 244, 306, 298, 375, 428,
06 mg/dl, resp.; the IgM levels were 127, 204,
193, 212, and 230 mg/dl, resp.; and the 2M
s were 179, 325, 224, 335, 370, and 357 mg/dl,
Except in chronic active hepatitis, the mean
evels in the patients with liver disease were
significantly elevated in comparison with those
althy subjects. Haptoglobin levels in all but
hronic inactive hepatitis patients were signi-
tly lower than those in the healthy subjects;
evels were 148, 102, 102, 43, and 77 mg/dl in
ealthy subjects and the patients with chronic
e hepatitis, incipient cirrhosis, cirrhosis,
rimary liver cancer, resp. Transferrin levels
e patients with chronic active hepatitis and
ic inactive hepatitis (267 and 264 mg/dl, resp.)
significantly elevated in comparison with those
althy subjects (228 mg/dl) and the patients
other liver diseases. The mean lagp levels
significantly decreased in the patients with
chronic active hepatitis, incipient cirrhosis, and cirrhosis. The results suggest that increased transferrin levels may be used in distinguishing between chronic hepatitis and cirrhosis or primary liver cancer. It appears that as chronic hepatitis progresses toward liver cirrhosis, 1AT increases and haptoglobin decreases. The protein profile of liver cancer is a normal lagp level and an increased 1AT level. The α-globulin profile may be used for differential and prognostic diagnoses in liver diseases.

8991 INDICES OF CELLULAR IMMUNITY IN PATIENTS WITH CHRONIC ACTIVE HEPATITIS. (Rus.)

Severov, M. V.; Semendiaeva, M. E.; Traianova, T. G.; Mukhin, A. S. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (5):107-112; 1975.

Sensitization to autologous and homologous liver tissue antigens and to hepatitis B antigen (HBAg)-containing serum was studied by the leukocyte migration inhibition (LMI) test in 17 patients with chronic persisting hepatitis, in 11 patients with secondary hepatopathies (unspecific ulcerative colitis, drug-induced diseases, functional hyperbilirubinemia, obstructive jaundice, opisthorchosis, and Hashimoto's disease), in 8 patients with alcoholic liver disease, and in 10 control subjects. The LMI test for homologous liver tissue was positive in 12 and negative in 5 patients with chronic persisting hepatitis; it was positive only in 3 of the 19 patients with secondary and alcoholic liver disease. Delayed type hypersensitivity to autologous liver tissue was observed in 4 of the 12 investigated patients with chronic persisting hepatitis. Significantly increased α-globulin and immunoglobulin A (IgA) levels were found in the 12 LMI-positive patients with chronic persisting hepatitis, while the α-globulin, IgA, IgM, and IgG levels were normal in the LMI-negative patients. Delayed type hypersensitivity to HBAg-containing serum was observed in 53.8% of the patients with chronic persisting hepatitis.

8992 HUMORAL AND CELL-BOUND IMMUNOLOGICAL REACTIONS IN CHRONIC HEPATITIS. (Ger.)

Maerker-Alzer, G.; Schumacher, K. (Medizinische Universitatsklinik, D-5000 Koln 41, Josef-Stelzmann-Strasse 9, W. Germany). *Leber Magen Darm* 5(4):132-139; 1975.

The correlation between immunologic criteria and differential diagnosis of chronic liver disease is explored. In highly active chronic hepatitis, the immunoglobulin G (IgG) level is high, IgA is moderate, and IgM is negligible. Nuclear antibodies are in 70-80% of all patients; mitochondrial antibodies are in <10%; smooth muscle antibodies are in 66%; vascular membrane antibodies are rare; and surface antigen is negative. In chronic hepatitis of low activity, IgG is moderate and IgA and IgM are negligible. Nuclear antibodies occur in <20% of the patients, mitochondrial antibodies in about 50%, smooth muscle antibodies in 30%, vascular membrane antibodies in 60%, and surface antigen is frequently positive. In primary biliary cirrhosis, IgG is moderately elevated, IgA is negative, and IgM is markedly elevated. Nuclear antibodies occur in 29% of the patients, mitochondrial antibodies in 92%, smooth muscle antibodies in 40%, vascular membrane antibodies in 0%, and surface antigen is negative. In alcoholic cirrhosis, IgG and IgA are extremely high, IgM is absent, nuclear antibodies are negligible, and mitochondrial, smooth muscle, and vascular membrane antibodies and surface antigen are negative. These patterns provide sufficient data to support a suspected disease, but they require histologic and other criteria to establish a diagnosis.

8993 INDICATIONS FOR AND RESULTS FROM IMMUNOSUPPRESSIVE THERAPY IN CHRONIC ACTIVE HEPATITIS IN CHILDREN. (Ger.) Baumann, W. (Universitats-Kinderklinik, D-6500 Mainz 1, Langenbeckstr. 1, W. Germany). *Monatschr. Kinderheild.* 123(8): 630-632; 1975.

Experiences with immunosuppressive management of pediatric chronic active hepatitis (ACH) were generalized. The clinical sample included 10 boys and 4 girls, 2.5-18 yr of age. All had elevated serum transaminase; 9 were Australia antigen-positive, 10 were positive to antinuclear factors, and 12 were positive to cell immune reactions. Pathological immunoglobulins were established in 11 children, and 9 were hypergammaglobulinemic. At biopsy, 9 children had prominent inflammation, and 10 were fibrotic. Initial therapy in seven patients included azathioprine (AZP, 2-3 mg/kg/day) and prednisone (PRN, 5-15 mg/day); serum was normalized in 3 months, the tissue in 1 yr. PRN was then interrupted, and AZP was reduced to 0.5-1.0 mg/kg/day; the patients have remained recurrence-free. Four children received PRN alone (2-3 mg/kg/day). Several recurrences were discovered, and exacerbation of the histology occurred in four, including development of progressive cirrhosis with portal hypertension in one case. In patients (adult or pediatric) with positive immunity and marked inflammatory signs, immunosuppressives are justified, particularly combined with glucocorticoids. Success is questionable in cases of incipient or progressive fibrosis. Australia antigen-positive ACH responds poorly to immunosuppressives, and rapid fibrosis is frequent.

8994 IMMUNOSUPPRESSANTS IN CHRONIC LIVER DISEASES (LITERATURE REVIEW AND NEW DATA). (Rus.) Podymova, S. D.; Nasonov, E. L. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 48 (3):40-48; 1976.

Studies on the therapeutic effectiveness and side-effects of immunosuppressants in chronic liver diseases are reviewed, and new therapeutic data on the use of azathioprine in 11 patients with chronic cholangiolitic hepatitis and in 9 patients with chronic persisting hepatitis are presented. Initial signs of liver cirrhosis were observed in five patients with cholangiolitic hepatitis. The azathioprine doses ranged from 25 to 150 mg/day, being 50-100 mg/day in most cases, and were combined with 5-15 mg of prednisolone. The duration of the therapy was up to 1 yr in 11 cases and up to 2 yr in 9. The azathioprine therapy had a favorable clinical effect (alleviation of pruritus) in seven patients with cholangiolitic hepatitis; it was ineffective in three, and the effect was doubtful in one. The all viation of pruritus appeared usually 7-14 days afte the initiation of therapy. Favorable clinical chan were observed in all patients with chronic persisti hepatitis. The azathioprine therapy caused a signi icant reduction of the transaminase and alkaline phosphatase activities and of the immunoglobulin M (IgM) and IgG levels. The phytohemagglutinin test revealed an increased lymphocyte blast transformation index in all cases. The duration of the remission was up to 8 months in 2 cases, up to 6 months in 1 case, up to 4 months in 11 cases, and up to 2 months in 3 cases. Azathioprine showed no marke advantage over prednisolone in terms of prognosis. The negative effect observed in three cases was du to the hepatotoxicity of the preparation, which manifested itself in jaundice, an increased biliru level, and increased transaminase activity. Thrombocytopenia was observed in 10 cases, and fever wa seen in 1. The findings indicate the therapeutic value of azathioprine, preferably combined with pr nisolone, in the treatment of chronic liver diseas involving pronounced immune disorders.

8995 OXYPROLINE EXCRETION IN CHILDREN WITH CHRONIC DISEASES OF THE LIVER. (Rus.) Zhivitsa, L. V.; Safonova, E. S. (Central Inst. Po graduate Medical Studies, USSR). *Vopr. Khr. Mater Det.* 21(5):64-67; 1976.

Oxyprolinuria was studied in 14 children with chro persisting hepatitis, in 8 children each with chro aggressive hepatitis and liver cirrhosis, and in 1 children with extrahepatic form of portal hypertension and secondary liver fibrosis. The patients were aged 3-15 yr. The length of the disease rang from 6 months to 10 yr. Marked correlation was established between the severity and activity of the hepatopathy and the oxyprolinuria. The oxyprolinuria was significantly and considerably increas during the exacerbation of hepatitis and cirrhosis and was reduced to slightly below normal levels du remission. The oxyprolinuria was slightly below normal in secondary liver fibrosis. The oxyprolin test proved to be more reliable than the thymol test or proteinograms in the determination of the status of the connective tissue in chronic persist and aggressive hepatitis and in liver cirrhosis.

8996 CHRONIC ACTIVE HEPATITIS AND OXYPHENISATIN. (Fre.) Berthelot, P.; Dhumeaux, Metreau, J.-M. (Unite INSERM U-99, Hopital Henri-Mondor, F 94010 Creteil, France). *Arch. Fr. Mal. App. Dig.* 64(8):711; 1975.

The case history of a 69-yr-old woman with oxyphe sitin (OX)-induced liver injury is presented. Icterus of 6 weeks duration, marked hepatomegaly, no splenomegaly, and no sign of hepatic insuffici cy were noted. For 15 yr the patient took the equ alent of 20-30 mg OX for chronic constipation. T following paraclinical data were established: bi rubin, 90 mg/l; SGPT, 380 IU; alkaline phosphatas

3 IU; and γ-globulin 33 g/1. Hepatitis B surface
ntigen was negative. Laparoscopy revealed a nodu-
ar liver, biopsy, significant portal sclerosis and
lffuse lymphoplasmocytic infiltration. Although
X use was interrupted, the patient died 2 months
ater of gastrointestinal hemorrhage. The diagnosis
as chronic active hepatitis.

)97 DIFFUSE RETROPERITONEAL FIBROSIS, CHRONIC
HEPATITIS, AUSTRALIA ANTIGEN: POSSIBLE
LE OF THE ANTIGEN IN THE INDUCTION OF FIBROSIS.
re.) Thomas, M.; Boccon-Gibod, L.; Pradalier, A.
ervice d'Endocrinologie-Nutrition, Hopital Saint-
toine, 184, rue du Fg St-Antoine, 75012 Paris,
ance). *Med. Chir. Dig.* 5(2):79-82; 1976.

e role of Australia surface antigen (HBsAg) in
patitis fibrogenesis is examined in a woman present-
g with a history of weight loss, asthenia, arthral-
a, and right lumbar pain. Initially, the SGPT was
0 Frankel units (FU), with subsequent febrility
d transient icterus; it rose to 3,200 FU before
uctuating. The patient was positive for HBsAg
/70). There was leukocytosis, but the liver was
t palpable. Bilateral ureteral stenoses were
tected. The stenoses and lumbar pain receded under
mg prednisolone, and the SGPT and alkaline phos-
atase levels returned to normal. The HBsAg persist-
, with slight hepatocyte insult and minimal infilt-
tion. Maintenance on 30 mg prednisolone normal-
ed all paraclinical variables, but HBsAg remained
sitive (1/16) and the hepatitis persisted. Reduc-
on of prednisolone to 10 or 15 mg resulted in SGPT
evations; HBsAg was positive (1/4). Six months
er, HBsAg increased to 1/128 and the liver showed
onic persistent hepatitis; all other variables
e stable. It is suggested that corticotherapy
presses host-antigen immune complex formation,
owing persistence of the virus and its hepatic
ects.

)8 COMPARATIVE CLINICAL EVALUATION OF LIVER
FUNCTION TESTS AND OF THE IMMUNE STATUS
PATIENTS WITH CHRONIC LATENT AND CHRONIC ACTIVE
ATITIS. (Pol.) Juszczyk, J.; Mallek, D.;
zka, W. (Klinika Chorob Zakaznych, Instytutu
rob Wewnetrznych, ul. Wincentego 1, 61-003 Poz-
, Poland). *Przegl. Lek.* 32(2):260-264; 1975.

8999 CLINICAL INVESTIGATION OF SILYMARIN IN CHRONIC LIVER DISEASES. (Fre.) Realini, S.; Gonvers, J. J.; Hofstetter, J.-R. (Policlinique Medicale Universitaire de Lausanne, rue Cesar-Roux 19, 1005 Lausanne, Switzerland). *Schweiz. Rundschau Med.* 64(19):595-598; 1975.

9000 PROGNOSIS OF CHRONIC HEPATITIS IN CHILDREN. (Cze.) Lukes, J.; Lukesova, M.; Zavazal, V. (Pediatricka klinika lekarske fakulty University Karlovy, 305 99 Plzen, Marxova 13, Czechoslovakia). *Cas. Lek. Cesk.* 114(36):1112-1115; 1975.

9001 CHRONIC HEPATITIS IN THE CHILD. A STUDY OF 19 CASES. (Spa.) Ortega Negrin, A.; Alvarez Alonso, M.; Fernandez Castellanos, G.; Delgado Lopez, H. E.; Quintero Enamorado, I. (Pediatria, Hospital "Pedro Borras Astorga," F y 27, Vedado, Habana, Cuba). *Rev. Cubana Pediatr.* 47(2):295-310; 1975.

9002 MULTICENTER CLINICAL TRIAL OF IMMUNOSUPPRESSIVE THERAPY IN CHRONIC AGGRESSIVE HEPATITIS. (Pol.) Gorski, M.; Barciszewski, M.; Bielawski, W.; Cichecka, A.; Gabryelewicz, A.; Hasik, J.; Kaszewska-Jablonska, I.; Kuska, J.; Milewski, B. (Komitet Terapii Doswiadczalnej, Komisja Terapii Kontrolnej, Zespol Roboczy do Oceny Immunosupresyjnego Leczenia Przesleklego Aktywnego Zapalenia Watroby, Poland). *Pol. Tyg. Lek.* 30(26):1093-1096; 1975.

See also, 8884, 8893, 8920, 8930, 8971, 8978, 9024, 9037.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

3 HEPATOCELLULAR HYALIN AND ITS CLINICAL SIG-
NIFICANCE. (Rus.) Mansurov, K. K. (Tad-
k Inst. Gastroenterology, Dushanbe, USSR). *Ter.*
h. 48(3):48-56; 1976.

er biopsy was performed on 168 alcoholic patients.
24 patients with steatonecrosis, 4 showed Mallory
ies, and 3 of these showed necrotic changes and cellular infiltration. Eleven patients without Mallory bodies demonstrated only a slight degree of necrosis and infiltration. Chronic hepatitis was diagnosed in 35 patients. Clinical manifestations were more severe in the patients with Mallory bodies: 10 of 13 patients with Mallory bodies had jaundice, as opposed to 5 of 22 patients without them. Necrosis of the liver was observed in all patients with

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Mallory bodies and in only 10 patients without them. Of 107 patients with alcoholic cirrhosis, 70 had Mallory bodies. Jaundice, ascites, and fever were more frequent among the patients with alcoholic hyaline. This study supports the view that alcoholic hyaline is a frequent, but not specific, component of the parenchymal injury of the liver. Its presence may indicate the imminence of severe hepatic disease.

9004 RENAL TUBULAR ACIDOSIS AND ALCOHOLIC LIVER DISEASE. (Fre.) Vesin, P.; Gouerou, J.; Dervichian, M.; Agar, D.; Azogui, M.; Cattan, D. (Faculte de Medecine de Creteil, Service de Medicine et Hepato-Gastro-Enterologie, Nouvel Hopital, F94190 Villeneuve-Saint-Georges, Creteil, France). *Arch. Fr. Mal. Appar. Dig.* 65(3):209-214; 1976.

The relation of complete tubular acidosis to alcoholic liver disease was explored in two patients. A 40-yr-old chronic alcoholic presented with hypokalemia, natremia, chloremia, and hepatomegaly. The amino aciduria, phosphaturia, and glycosuria results were normal. The ammonemia level was normal; urea protein was 70 g/l. Both β- and γ-globulins were elevated. A 45-yr-old chronic alcoholic with a history of disorientation and motor dysfunction presented with hepatomegaly, hypokalemia, creatinemia, a total protein of 70 g/l, and only slightly elevated γ-globulin. The kalemia, chloremia, blood urea, creatinemia, and natremia were exacerbated by 140 mEq of K ion. Liver biopsy found a massive steatosis and annular cirrhogenic sclerosis. The amino aciduria, phosphaturia, and glycosuria were normal. Neither patient showed evidence of autoimmune disease. It is inferred that the two patients could not secrete H ions from the distal tubules.

9005 MACROCYTOSIS IN CHRONIC ALCOHOLIC HEPATITIS. (Fre.) Buffet, C.; Chaput, J.-C.; Albuisson, F.; Subtil, E.; Etienne, J.-P. (Service d'Hepatologie et de Gastroenterologie, Hopital Antoine-Beclere, F 92140 Clamart, France). *Arch. Fr. Mal. App. Dig.* 64(4):309-315; 1975.

The frequency of macrocytosis in acirrhotic chronic alcoholic hepatitis (ACAH) was compared in various patient groups relative to mean corpuscular volume (MCV). The samples included 55 patients with ACAH (group 1), 10 chronic alcoholics with histologically normal livers (group 2), 13 acute alcoholics without hepatomegaly (group 3), 23 patients with nonalcoholic chronic hepatitis (group 4), and 50 alcoholic cirrhotics (group 5). The MCV of 45 of 55 group 1 patients was elevated to 103.8 μm^3 (99-117) 48 hr after hospitalization. The transaminases were also raised in 48 of 55. BSP was normal in 18 of 43, reduced in 9 of 43, and pathologically lower (0.043-0.092) in the remaining 16. Histology showed some degree of steatosis in all cases and fibrosis in 34 55 patients. There was no correlation between transaminase elevation, BSP depression, or steatosis and MCV. The MCV of group 4 was normal in 21 of 23 and significantly lower ($p<0.001$) at 93.4 μm^3 than group 1. An increased MCV can be found in chronic alcoholics with histologically normal livers. Group 3 showed no MCV elevation. In group 5, 44 of 50 had a increased MCV (105.8 μm^3). During hospitalization, the macrocytosis in 24 group 1 patients with an MCV greater than 100 μm^3 decreased within 15 days if the patient became abstinent. MCV is concluded to be a suitable index for chronic alcohol screening.

9006 MULTIPLE PRIMARY MALIGNANCIES IN PATIENTS WITH ALCOHOLIC LIVER DISEASE: A REPORT O TWO CASES. (Eng.) Mihas, A. A.; Doos, W. G. (Univ Alabama Medical Center, Birmingham, AL 35294). *Oncology* 31(5/6):280-287; 1975.

9007 DIAGNOSIS AND COURSE OF INFECTIOUS PERITONITIS IN ALCOHOLIC CIRRHOSIS WITH ASCITES [Abstract]. (Eng.) Stanley, M. M. (Veterans Admin Hosp., Hines, IL). *Clin. Res.* 23(4):520A; 1975.

9008 RELATION OF ALCOHOLIC LIVER INJURY TO CIR ROSIS. (Eng.) Rubin, E.; Lieber, C. S. (No affiliation given). *Clin. Gastroenterol.* 4(2): 247-272; 1975.

9009 THE METABOLISM OF ALCOHOL. (Eng.) Liebe C. S. (No affiliation given). *Sci. Am.* 234(3):25-33; 1976.

See also, 8924, 8999.

LIVER AND BILIARY TRACT

Cirrhosis

9010 A RATIONAL APPROACH TO THE TREATMENT OF ASCITES. (Eng.) Arroyo, V.; Rodes, J. (Hospital Clinico y Provincial, Univ. Barcelona, Barcelona, Spain). *Postgrad. Med. J.* 51(598):558-562; 1975.

Information concerning the treatment of ascites is reviewed, with particular emphasis on a study in which 55 cirrhotic patients were classified according to their ability to excrete sodium and free water. The glomerular filtration rate (GFR), rena

sma flow (RPF), free water clearance (after an
. water load of 20 ml/body weight), plasma sodium
centration, and urinary sodium concentration were
ermined after 7 days of bed rest and low salt in-
e. Twenty-one patients were losing ascites after
7-day period; these patients had a high mean
nary sodium concentration (82.3 mEq/1) and were
sidered "salt tolerant." The other 34 patients
e considered salt intolerant and had a signifi-
tly lower urinary sodium concentration (7.7
/1). The criteria of classification with regard
renal capacity to excrete free water were ob-
ned after plotting free water clearance against
sma sodium concentration. When free water clear-
was less than 1 ml/min, overhydration and hy-
tremia usually occurred; patients with free
r clearance greater than 1 ml/min were, there-
, considered water tolerant, and those with
water clearance lower than 1 ml/min were con-
red water intolerant. On the basis of these
eria, there were three groups of patients:
p 1, 21 patients who were water and salt toler-
group 2, 17 patients who were water tolerant,
salt intolerant; and group 3, 17 patients who
water and salt intolerant. Groups 1 and 2 had
tively good renal function. There were no sig-
cant differences between these two groups in
and mean RPF (686 ml/min for group 1 and 552 ml/
for group 2). Group 3 had a significantly lower
and RPF (363 ml/min, $p<0.001$). Group 1 patients
ascites on bed rest and low salt intake alone,
this process was accelerated by the administra-
of distal diuretics. All patients were dis-
ged without ascites. Group 2 patients needed
etics because of the low urinary sodium concen-
ion, but all but one showed a positive response
istal diuretics. Four patients died, and this
ality was significantly higher than in group 1
.05). In group 3, only 5 of 15 treated patients
onded to treatment, and the remaining patients
. An additional patient among the 17 survived;
mortality was significantly higher than in
2 ($p<0.05$).

COMPARISON OF THE INDICES OF THE BROMSUL-
PHALEIN TEST, THE SERUM CHOLINESTERASE
HE GALACTOSE TEST BY HEPATIC CIRRHOSIS. (Eng.)
ev, M. (I. P. Pavlov Higher Medical Inst.,
iv, Bulgaria). *Folia Med.* 16(3):151-156; 1976.

iagnostic values of the BSP test, serum cholin-
ase activity (SCE), and the galactose test (GT)
atients suffering hepatic cirrhosis were com-
. The BST and SCE were assessed simultaneously
patients, the BST and GT were assessed in 100
nts, and the GT and SCE were assessed in 57
nts. There was a slight, inversely proportional
lation between BST and SCE, and the changes of
indices were markedly parallel. BST was posi-
in 94% of the cases and SCE was positive in 85%.
arallelism between the values of BST and SCE
ore marked in the patients with ascites and
marked in those without ascites. The GT was
ive in 42%, mildly positive in 19%, and nega-
in 39%. These data and the 94% positive BST
t show that the excretory function of the liver
is more impaired than the carbohydrate function. Therefore, the diagnostic value of the BST is superior to the GT. The diagnostic value of SCE (82%) was also much better than that of the GT (59%). It is concluded that in hepatic cirrhosis the excretory function of the liver is the most affected, followed by the enzyme-synthesizing function and then the carbohydrate function. Thus, the BST test is the most useful, followed by lowered serum cholinesterase activity and the GT, in the diagnosis of hepatic cirrhosis.

9012 SOME COMMENTS ON THE ACTUAL ASPECT OF "PRIMARY BILIARY CIRRHOSIS." (Fre.)
Sotgiu, G. (Istituto di Clinica Medica Generale e Terapia Medica dell'Universita di Bologna, Bologna, Italy). *Ann. Gastroenterol. Hepatol.* 11(3):169-195; 1975.

The current status of primary biliary cirrhosis is reviewed. The nosology, histology, immunology, etiology, clinical picture, differential diagnosis, physiopathology, and therapy are examined, and the relation of destructive nonsuppurative chronic cholangitis, active chronic hepatitis, and intrahepatic cholestasis to primary cirrhosis is explored. The orientation is relatively novel. A distinction is made in cirrhotic pathology between obstructive involvement of the canaliculi and ductules by solid luminal material and destructive involvement of the larger ductules and ducts by the disappearance or obliteration of littoral elements. Destruction is generally distal to obstruction and is a result of cholestasis. Abnormal bile acids are interpreted as both the cause and effect of cholestasis, leading to biliary stasis, stromal inflammation, fibrosis, and cirrhosis. The primary condition is construed as an idiopathic biochemical lesion probably based on a congenital enzymatic defect that develops into an icteric cholestasis, in contrast to extrahepatic cholestasis, which is icteric throughout its course. The disease could be sex-linked, since a female predominance has been reported. For several reasons, among which is the similarity of biliary cirrhosis with collagen disease, a primary genetic immunological defect is considered probable.

9013 THE "UREA INDEX" AS A MARKER OF PORTAL FLOW DIRECTION IN CIRRHOSIS OF THE LIVER.
(Eng.) Hazenberg, H. J. A.; Gips, C. H. (Interne Afdeling, St. Jozefziekenhuis, Deventer 6600, Netherlands). *Acta Hepatogastroenterol. (Stuttg.)* 23(2):93-100; 1976.

The hepatic venous/arterial ratios were studied in 50 controls and 52 patients with cirrhosis to define the optimal interval for determining the ratio of hepatic venous increment/arterial urea increment and to compare the results with other parameters in cirrhosis. Arterial and hepatic venous blood samples were drawn at intervals up to 120 min following p.o. loading with 20 g of urea. The increment of the hepatic venous urea from time zero, divided by the increment of the arterial urea was calculated for all intervals. The 0-15 min ratio was defined as the urea index. Urea indices were lower in patients with cirrhosis ($p<0.001$); the median ratio of the controls was 1.8, compared with 1.45 for the cirrhosis patients. Unlike abnormal ammonia tests found in the whole range of urea indices, normal ammonia tests were found in patients with normal indices only ($p<0.01$), and inices below 1.25 invarably were associated with an abnormal ammonia test ($p<0.001$). An urea index of 1.2 or less was correlated with a hepatic sinusoidal pressure (HSP) value of 8 mm Hg or more (sign test, $p<0.01$). The inverse was not found. In patients with an index of 1.2 or less, ascites was more often present ($p=0.03$) than in patients with a higher index. Ascites was correlated with an HSP of 8 mm Hg or more ($p<0.01$). It is concluded that a normal HSP combined with a low urea index may indicate a diversion of the portal blood flow due to extrahepatic causes.

9014 ISOTOPIC DYNAMIC STUDY OF FIBRINOGEN METABOLISM IN LIVER CIRRHOSIS. (Fre.)

Delmont, J.; Bisset, J.; Rampal, P.; Camous, J.-P.; Faure, X. (Centre d'hepato-gastro-enterologie, 4, avenue Reine Victoria, 06100 Nice, France). *Nouv. Presse Med.* 5(25):1567-1569; 1976.

Fibrinogen metabolism was studied in cirrhotic patients. The subjects included 57 patients with varying degrees of hepatic insufficiency and 25 controls without liver or blood dyscrasias. The fibrinogen was labeled with ^{125}I, and the test was followed for 3-8 days. The biological period was lower in 49% of the cirrhotic group compared with 8% of the controls ($p<0.0001$). The plasma pool was also lower in 54% of the cirrhotic group compared with 8% of the controls. Four homogeneous populations emerge if the biological period is plotted against the plasma pool and the control and cirrhotic groups are combined. In group 1, consisting of 22 of 25 controls and 13 cirrhotics, the biological period and plasma pool were normal. In group 2, 13 cirrhotics and 1 control, the period was diminished and the pool was normal. In group 3, 16 cirrhotics and 1 control, the pool was reduced and the period was normal. In group 4, 15 cirrhotics and 1 control, both the period and the pool were diminished. In nine patients, including three from group 2 and six from group 4, heparin significantly raised the labeled fibrinogen period from 0.4 to 1.1 days, or from 15% to 48% of initial values ($p<0.01$). Neither the plasma pool nor the percent of plasma pool catabolized was significantly changed. This procedure provides an index of therapeutic effectiveness in managing consumption coagulopathies in cirrhosis.

9015 GASTRIC ACID SECRETION AND BASAL GASTRINEMIA IN CIRRHOSIS. (Fre.)

Bekhti, A.; Brassinne, A. (Rue Jean d'Outremeuse 79, B-4000 Liege, Belgium). *Rev. Fr. Gastroenterol.* (120):29-38; 1976.

Stimulated and basal gastric acid secretion and fasting gastrinemia were assayed in 21 patients with liver cirrhosis. Basal secretion was higher than normal (6 mEq/hr) in only three patients. One was a 69-yr-old alcoholic with a recent history of cirrhosis plus ascites and duodenitis; he had a basal secretion of 6.55 mEq/hr. The second was a 36-yr-old man with hepatitis, icterus, ascites, duodenal ulcer, and a secretion of 8.21 mEq/hr. The third patient was a 64-yr-old man with hepatitis, recent cirrhosis, normal gastric radiology, and a secretion of 11.43 mEq/hr. After pentagastrin stimulation, 4 of 17 patients showed either reduced secretion or none; after histamine stimulation, 1 of 4 patients showed reduced secretion. Three patients registered increases after pentagastrin. Fasting gastrinemia was within the normal range (39 pg/ml) for all patients. There was no correlation between variations in basal or stimulated acid secretion and gastrinemia or between these variables and the age or state of the cirrhosis. In one case of decompensated cirrhosis, pentagastrin stimulation increased acid secretion from 7.9 to 16.88 mEq after 1 yr.

9016 POTASSIUM METABOLISM AND DIURETICS ADMINISTRATION IN LIVER CIRRHOSIS. (Eng.)

Vesin, P. (31 rue de Moscou, 75008 Paris, France). *Postgrad. Med. J.* 51(598):545-548; 1975.

Changes in potassium metabolism in patients with cirrhosis, and the use of diuretics in the treatment of these patients, are reviewed. In the initial state of cirrhosis, salt and water retention are mild and transient, overt edema and ascites are absent, urinary output of K (Ku) and serum K (Ks) levels are normal, and a significant reduction of exchangeable potassium (Ke) has been noted in only a few cases. Stage 2 of cirrhosis is characterize by a marked salt and water retention, ascites, and edema (mainly the result of aldosterone hypersecretion). Ks is either normal or at the lower limit of normality; the Ku can be slightly increased or decreased or normal. In the third stage of cirrhosis, Ks sharply increases (sometimes reaching values above 5.5-6 mEq/l), Ku falls to figures sometimes below 20 mEq/24 hr, and Ke is markedly decreased, entailing a poor prognosis. Urinary K loss, which results indirectly from aldosterone hypersecretion, does not appear to be a major factor in the severe Ke reduction. A major hazard of diuretic therapy of cirrhotics, hypokalemia-induced portacaval encephalopathy, has been elimin ated by the discovery of K-sparing diuretics (spir nolactone, triamterene, and amiloride). The use of glucorticoids (especially prednisone) as diuretics also does not lead to hyperkalemia. The effects of the K-sparing diuretics on K metabolism are limited. They may moderately enhance Ku; following cessation of therapy, a rebound in Ku may b noted; and Ke may continue to decrease during thei administration, indicating an aggravation of the underlying disease. In addition, the K-sparing diuretics do not suppress the inability of the cel to retain or bind K. A rise in Ks and/or Ke durin amiloride administration does not prevent the ele vation of plasma renin activity, usually induced b volume and/or Na depletion.

LIBRARY U. OF I. [illegible]

7 CYTIDINE-5'-MONOPHOSPHATE-N-ACETYLNEURAMINIC
ACID. ASIALOGLYCOPROTEIN SIALIC ACID TRANS-
ASE ACTIVITY IN LIVER AND SERUM OF PATIENTS WITH
ENILE HEPATIC CIRRHOSIS AND α-1-ANTITRYPSIN DEFI-
NCY. (Eng.) Kuhlenschmidt, M. S.; Peters, S. P.;
kard, O. D.; Glew, R. H.; Sharp, H. (Dept. Bio-
mistry, Univ. Pittsburgh Sch. Medicine, Pitts-
gh, PA 15261). *Biochim. Biophys. Acta* 429(2):
-373; 1976.

um sialyltransferase (ST) activity was measured
the serum of six patients (aged 8-13 yr) with
-antitrypsin deficiency and hepatic cirrhosis.
six patients exhibited significantly decreased
um ST activity; it was only 50% that of healthy
iatric controls and 30% that of pediatric patients
n liver disease unrelated to α-1-antitrypsin
iciency. Family members who were homozygous for
-antitrypsin deficiency, but without hepatic
rhosis, did not show serum ST deficiency, and
ther did patients with various other liver dis-
es. Assays performed on a liver homogenate from
atient with α-1-antitrypsin deficiency and hepatic
rhosis did not show a deficiency in liver ST
ivity. A comparative kinetic analysis of serum
liver ST activity in normal and afflicted indi-
uals did not detect differences in substrate af-
ities that would explain a decrease in functional
capacity in individuals with α-1-antitrypsin
iciency and hepatic cirrhosis. This decrease in
um ST activity may result from extensive liver
age involving hepatic accumulation of α-1-anti-
psin.

3 OPERATIONS STIMULATING THE REGENERATION OF
LIVER IN CIRRHOSIS. (Rus.) Nartsissov,
7. (Kalinin Medical Inst., Kalinin, USSR). *Klin.*
. (2):30-33; 1976.

erience with hepatectomy to stimulate the regenera-
n of the liver in cirrhosis is presented on the
is of surgery on 34 patients. Laennec's cirrhosis
diagnosed in 27 patients, postnecrotic cirrhosis
3, and mixed cirrhosis in 4. Nine patients were
a compensated state at surgery; 25 were subcom-
sated, of which 12 were close to being decompen-
ed. The resection of segments II and III of the
lobe was anatomically most convenient, and was
formed in 30 cases. The weight of the resected
er tissue ranged from 28 to 550 g, depending on
size of the liver. Omentohepatopexy was performed
tionally in 24 cases for hemostasis and to improve
hepatic perfusion. Omentohepatodiaphragmopexy
performed in eight cases, and hypersplenism
essitated ligation of the splenic artery in five
es. Splenectomy was performed in six cases.
tes in the anamnesis necessitated Kalb's opera-
n in 13 cases. The severe postoperative complica-
ns included seepage of ascitic liquid from the
nd, oliguria, meteorism, pneumonia, acute hepato-
l failure, blood clotting disorders, and bleeding
n esophageal and gastric veins. The postoperative
ality was 13 of 34 cases; it was due to fibrino-
c hemorrhage in 5 cases, to acute hepatorenal
ure in 4, to bleeding from varicose veins of the
hagus and stomach in 2, to purulent pleuritis with subsequent acute hepatic failure in 1, and to peritonitis in another. Eight patients are in good condition, and another five are in satisfactory condition 0.5-6.5 yr after surgery. During this period, two patients died of acute hepatorenal failure, and one each of esophageal bleeding, peritonitis, pneumonia, and liver cancer. Reduction of the cirrhotic changes was observed at autopsy or surgery in four patients 2-3.5 yr after hepatectomy. The findings indicate that hepatectomy is indicated for compensated and subcompensated cirrhosis without varicose veins in the esophagus and stomach and esophageal and gastric hemorrhages in the anamnesis.

9019 CIRRHOTIC TRANSFORMATION OF BESNIER-BOECK-SCHAUMANN SYNDROME: ANATOMO-CLINICAL STUDY. (Fre.) Chomette, G.; Sarrazin, A.; Sors, Ch.; Emerit, J.; Auriol, M. (Service d'Anatomie pathologique, CHU Pitie-Salpetriere, 47, boulevard de l'Hopital, F 75634 Paris Cedex, France). *Ann. Med. Interne (Paris)* 127(2):101-107; 1976.

The development of cirrhosis in a patient with Boeck's sarcoid is reported. A 69-yr-old woman with an unexceptional medical history was hospitalized for recurrent bronchopathies. She was hepatomegalic, and her sedimentation rate was elevated. Bronchoscopy and laparoscopy showed identical punctiform granulations without cirrhotic nodules on the bronchial mucosa and liver surface, resp. The diagnosis was sarcoidosis. Subsequent biopsy confirmed the development of a granulomatous sarcoid with incipient cirrhosis. There was hypergammaglobulinemia and an abnormal flocculation test. Liver function was normal 1 yr later, except for elevation of BSP and alkaline phosphatase levels. The hepatomegaly was unchanged the following year, and signs of incipient portal hypertension, positive thymol, and BSP appeared. Persistent hepatomegaly, without splenomegaly or ascites, was found 1.5 yr later. The patient was anorectic and in a diminished state. A sudden hematemesis was followed by melena. Fibroscopy found ruptured esophageal varices; hemorrhaging continued despite transfusions. An onset of icterus was followed by death in hepatic coma under hypoalbuminemia and elevated alkaline phosphatase levels (50 Bodansky units). Autopsy found multiple sarcoidosis (lung, spleen, liver, kidney, colon, nodes, pericardium, ovaries, marrow, and pancreas and the pituitary, thyroid, and salivary glands). Hepatic nodules, some florid and some sclerotic, were scattered irregularly through the parenchyma. Many hepatocytes were lysed and cholestatic. There was massive periportal sclerosis with parenchymal diffusion and no evidence of regeneration. Sarcoid granulations were also found on the colonic mucosa.

9020 HEMODYNAMIC ELUCIDATION OF PORTAL HYPERTENSION. (Ger.) Paumgartner, G. (Institut fur Klinische Pharmakologie, Universitat Bern, CH-3010 Bern, Murtenstrasse 35, Switzerland). *Z. Gastroenterol.* 13(Suppl.):113-119; 1975.

A review of the most important methods currently in clinical use for preoperative hemodynamic clarification of patients with liver cirrhosis is presented, with emphasis on their diagnostic and therapeutic roles. Hepatic vein catheterization is the pressure measurement of least risk; it contributes to establishing a diagnosis of portal hypertension. Advantages and disadvantages of various methods, including clearance and dye-dilution, for liver perfusion measurement are discussed. The dye extraction method, based on Fick's law, is the current procedure of choice. The diagnostic value of perfusion in cirrhosis is relatively small, due to the extraordinarily wide distribution of individual values; it is not a determiner of patients for portacaval shunt operations. The author prefers gauging arterial vascularization by angiographic reading of the hepatic artery diameter and the extent of collateral circulation.

9021 ERRORS IN SURGERY FOR PORTAL HYPERTENSION. (Rus.) Samofalov, V. P. (Volgograd Medical Inst., Volgograd, USSR). *Khirurgiia (Mosk.)* (4): 103-108; 1976.

Diagnostic and surgical errors in 230 patients with portal hypertension were analyzed. Acute cholecystitis (five cases), appendicitis (three cases), peritonitis (two cases), acute pancreatitis (two cases), renal colic (two cases), and paranephritis and intestinal obstruction (one case each) were erroneously diagnosed as liver cirrhosis. Hemorrhage due to portal hypertension was sometimes erroneously attributed to peptic ulcer, leukemia, hemophilia, gastric and hepatic tumors, chemical burn, and Werlhof's disease. Indication of surgery was established on the basis of erroneous diagnosis of hydatid disease of the liver and spleen in six cases and of acute abdomen in two. The surgical experience indicates that splenectomy is not indicated at the dystrophic stage of portal cirrhosis and in the absence of hypersplenism. Omentohepatopexy or omenorenopexy is insufficient in cases of emergency splenectomy. To prevent postoperative hemorrhage from dilated esophageal veins, the esophageal veins should be excluded from the portal vein system by the modified version of Tanner's operation. Splenorenal anastomosis is recommended for dilated esophageal veins with hemorrhage, but even this anastomosis may not prevent hemorrhage in exacerbated cirrhosis.

9022 CARCINOEMBRYONIC ANTIGEN (CEA) IN PRIMARY LIVER CANCER AND CIRRHOSIS [Abstract]. (Eng.) Economidou, J.; Manesis, E.; Hadziyannis, S.; Manousos, O.; Karvountzis, G. (Hippocration General Hosp., Univ. Athens Medical Sch., Athens, Greece). *Digestion* 12(4/6):300; 1975.

9023 PERCUTANEOUS SPLENOSCINTIGRAPHY, HEPATIC SINUSOIDAL PRESSURE AND PORTA-SYSTEMIC SHUNTING IN CIRRHOSIS [Abstract]. (Eng.) Weits, J.; Gips, C. H.; Beekhuis, H.; Niermeyer, P.; Piers, D. A. (Univ. Hosp., Groningen, Netherlands). *Digestion* 12(4/6):358; 1975.

9024 PRIMARY AND SECONDARY IMMUNE RESPONSES TO ϕX 174 IN PATIENTS WITH PRIMARY BILIARY CIRRHOSIS AND CHRONIC ACTIVE HEPATITIS [Abstract]. (Eng.) Thomas, H. C.; Holden, R.; Verrier-Jones, J.; Peacock, D. (Dept. Immunology, Glasgow Univ., Scotland). *Gut* 16(10):836; 1975.

9025 LYMPHOCYTE CYTOTOXICITY TO ISOLATED MITOCHONDRIA IN PRIMARY BILIARY CIRRHOSIS [Abstract]. (Eng.) Bootello, A.; Fernandez-Cruz, E.; Blanco, M.; Escartin, P.; Gosalvez, M.; Segovia-de-Arana, J. M. (Sch. Medicine, Universidad Autonoma, Madrid, Spain). *Digestion* 12(4/6):277-278; 1975.

9026 RESULTS OF RESECTIONS OF THE DISTAL ESOPHAGUS AND CARDIA IN PORTAL HYPERTENSION PATIENTS. (Rus.) Tsatsanidi, K. N.; Eramishantsev, A. K. (Div. Portal Hypertension, All-Union Scientific Res. Inst. Clinical and Experimental Surgery, Moscow, USSR). *Khirurgiia* (10):107-111; 1975.

9027 FUNCTIONAL STUDY OF THE GASTRIC MUCOSAL BARRIER IN CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Solis Herruzo, J. A.; Pardo Rueda, J. (Departamento de Medicina Interna, Ciudad Sanitaria de la Seguridad Social "1° de Octubre," Madrid, Spain). *Digestion* 12(4/6):351-352; 1975.

9028 CHANGES IN EXOCRINE FUNCTION OF PAROTID GLAND AND OF THE PANCREAS IN PATIENTS WITH NONALCOHOLIC LIVER CIRRHOSIS AND IN CHRONIC ALCOHOLICS [Abstract]. (Eng.) Bode, J. Ch.; Durr, H.-K.; Bode, C. (Medizinische Universitatsklinik, Marburg/Lahn, W. Germany). *Digestion* 12(4/6):289-290; 1975.

9029 FREE PLASMA AMINO ACID CHANGES IN PATIENTS WITH LIVER CIRRHOSIS AND ENCEPHALOPATHY AFTER PORTACAVAL ANASTOMOSIS. (Cze.) Blahnikova, L.; Horky, J.; Pechar, J.; Tomkova, D.; Vosmik, J. (Interni vyzkumna zakladna, Budejovicka 800, 140 00, Praha 4-Krc, Czechoslovakia). *Cesk. Gastroenterol.* 29(7):443-448; 1975.

9030 MESENTERICO-CAVAL SHUNT WITH JUGULAR VEIN FOR PORTAL HYPERTENSION. (Eng.) Stipa, S.; Thau, A.; Ziparo, V.; Schillaci, A. (Cattedra di Semeiotica Chirurgica I, Univ. Rome, Rome, Italy) *Bull Soc. Int. Chir.* 34(3):179-182; 1975.

9031 BILE ACID SECRETION AND POOL SIZE IN PATIENTS WITH CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Brunner, H.; Horak, W.; Slat, B.; Grabner, G. (Ordinariat fur Gastroenterologie, Vienna, Austria). *Digestion* 12(4/6):292; 1975.

9032 CONVERSION OF CHOLIC TO DEOXYCHOLIC ACID IN PATIENTS WITH CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Horak, W.; Brunner, H.; Grab-

r, G. (Ordinariat fur Gastroenterologie, Vienna,
stria). *Digestion* 12(4/6):259-260; 1975.

33 ENZYME INDUCTION IN CIRRHOTIC PATIENTS
[Abstract]. (Eng.) Escartin, P.; Rossi,
; Segovia-de-Arana, J. M. (Sch. Medicine, Univ.
tonoma, Madrid, Spain). *Digestion* 12(4/6):302-
3; 1975.

34 INCOMPLETE FIBRIN FORMATION IN LIVER
CIRRHOSIS [Abstract]. (Eng.) Brunswig,
; Klingemann, H. G.; Liehr, H. (Dept. Medicine,
iv. Wurzburg, Wurzburg, W. Germany). *Digestion*
(4/6):260-261; 1975.

35 RENAL EXCRETION OF HYDROGEN IONS IN
VARIOUS PHASES OF LIVER CIRRHOSIS: HYPER-
MONURIA AND ACIDIFICATION DEFECT. (Spa.) Barrio
mez, E.; Sanchez Creus, P.; Perez Oteiza, C.;
nilla, M. C.; Amarillas, L.; Gilsanz, V. (Catedra
Patologia y Clinicas Medicas, Universidad Complu-
nse, Madrid, Spain). *Rev. Clin. Esp.* 136(1):31-
; 1975.

36 REABSORPTION OF SODIUM IN THE RENAL DISTAL
DUCT IN HEPATIC CIRRHOSIS [Abstract].
ng.) Solis Herruzo, J. A.; Pardo Rueda, J. (De-
rtamento de Medicina Interna, Ciudad Sanitaria de
Seguridad Social "1° de Octubre," Madrid, Spain).
gestion 12(4/6):351; 1975.

37 EPIDEMIOLOGY OF CHRONIC LIVER DISEASES
[Abstract]. (Eng.) Jorke, D. (Municipal
sp. Jena, Jena, E. Germany). *Digestion* 12(4/6):
); 1975.

38 EFFECT OF MEFRUSIDE TREATMENT ON PLASMA,
ASCITIC FLUID, AND URINARY Na^+, K^+, AND
-CONCENTRATIONS AND ON THEIR EXCHANGE, AS WELL
ON DIURESIS IN CIRRHOTIC PATIENTS WITH ASCITES
stract]. (Eng.) Kehayoglou, K.; Karli, I.;
lopoulos, S. (Alexandra Hosp., Univ. Athens
ical Sch., Athens, Greece). *Digestion* 12(4/6):
; 1975.

9 A CASE OF POSTNECROTIC CIRRHOSIS CAUSED
BY HEPATITIS B VIRUS. (Ita.) Mattiacci,
Peronace, M. L. (Istituto di Malattie Infettive
l'Universita di Roma, Rome, Italy). *G. Mal.
ett. Parassit.* 27(7):451-452; 1975.

0 DEVELOPMENT OF ACUTE LESIONS OF GASTRIC
MUCOSA IN CIRRHOSIS DURING GASTROINTES-
AL BLEEDING [Abstract]. (Eng.) Bordas, J. M.;
, C.; Teres, J.; Bertran, A.; Bruguera, M.;
es, J. (Hospital clinico y provincial, Universi-
de Barcelona, Barcelona, Spain). *Digestion*
4/6):290; 1975.

9041 CLINICAL AND EXPERIMENTAL STUDY OF LIVER CIRRHOSIS: XI. NATURAL HISTORY AND CLINICO-PATHOLOGICAL ASPECTS OF ESOPHAGEAL VARICES [Abstract]. (Eng.) Okuda, K.; Kotoda, K.; Ito, S.; Oto, M.; Maeda, M.; Kanda, Y.; Igarashi, M.; *et al.* (Chiba Univ. Sch. Medicine, Chiba, Japan). *Jpn. J. Med.* 14(2):141-142; 1975.

9042 CIRRHOSIS OF THE LIVER IN IRAN: A RETROSPECTIVE STUDY BASED ON 1,326 CASES. (Eng.) Hedayat, Sh.; Shafaei, A.; Shariat, Sh.; Tabatabai; Lotfie, B. (Nutrition Div., Sch. Public Health, Teheran Univ., Teheran, Iran). *Environ. Child Health* 21(5):223-227; 1975.

9043 CIRRHOSIS AND HETEROZYGOUS α-ANTITRYPSIN DEFICIENCY IN A 4-YEAR-OLD GIRL. (Eng.) Cruz, M.; Molina, J. A.; Pedrola, D.; Munoz-Lopez, F. (Faculdad de Medicina, Casanova 143, Barcelona-11, Spain). *Helv. Paediatr. Acta.* 30(6):501-507; 1975.

9044 GASTRIC ACID SECRETION IN CIRRHOSIS AND VIRAL HEPATITIS. (Eng.) Sachdeva, J. R.; Chaudhry, I. A.; Alam, M. M. (Medical Coll., Patiala, Punjab, India). *J. Assoc. Physicians India* 23(10):663-666; 1975.

9045 SPONTANEOUS BACTERIAL PERITONITIS IN CIRRHOSIS: ENDEMIC OR EPIDEMIC? (Eng.) Correia, J. P.; Conn, H. O. (Hosp. Escolar Sta Maria, Lisbon, Portugal). *Med. Clin. North Am.* 59(4):963-981; 1975.

9046 RENIN SUBSTRATE INFUSIONS IN HEPATORENAL SYNDROME. (Eng.) McCombs, P. R.; Berkowitz, H. D.; Miller, L. D.; Rosato, E. F. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA). *Surg. Forum* 26:419-421; 1975.

See also, 8511, 8662, 8672, 8883, 8897, 8902, 8911, 8920, 8978, 8990, 8995, 8999, 9053, 9164, 9165.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

9047 ANATOMIC VARIATION IN THE GALLBLADDER AND BILE DUCTS. (Eng.) Hatfield, P. M.; Wise, R. E. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *Roentgenology* 11(3):157-164; 1976.

Information on the anatomic variations in the gallbladder and bile ducts is reviewed. The embryology of the gallbladder and extrahepatic ducts is discussed, together with the anatomic variations occurring in the gallbladder, cystic duct, extrahepatic ducts, and intrahepatic ducts. Agenesis of the gallbladder is of interest primarily because symptoms closely resembling those of cholecystitis may develop, even though the gallbladder is absent and the bile ducts appear entirely normal at surgery. If the peritoneal reflection that maintains the gallbladder in close apposition to the undersurface of the right liver lobe is lax or incomplete, a mobile or floating gallbladder may result, with intermittent herniation into the lesser sac through the foramen of Winslow. The partially or completely intrahepatic gallbladder greatly complicates cholecystectomy. Other anomalies of the gallbladder include suprahepatic, retrohepatic, and left-sided gallbladder, but these are rare. Cystic duct anomalies include completely separate insertion of the cystic duct into the duodenum; a duct that first passes anterior to the duodenum before coursing beneath it to insert into the common bile duct; and insertion of the cystic duct into the anterior or posterior margin of the common bile duct. Unlike the gallbladder and intrahepatic ducts, clinically significant anatomic variation in the extrahepatic ducts is uncommon and is usually the result of a generalized congenital aberration. Variation in the configuration of the ampulla of Vater and the point of junction of the pancreatic duct with the common bile duct is frequent and accounts for the often encountered difficulty in selecting the appropriate duct during retrograde p.o. cannulation. Large anomalous intrahepatic ducts that drain into the gallbladder occasionally occur; these may be severed at operation if unrecognized, resulting in persistent postoperative biliary fistula. The duct of the anterior or posterior segment of the right liver lobe may drain into the left rather than the right hepatic duct. Another common anomaly of the intrahepatic ducts is a low insertion of the right hepatic duct or of a segmental or subsegmental branch into the common hepatic duct. Meticulous cholangiographic examinations should reduce the occurrence of surgical injury due to the failure to recognize variations in biliary anatomy.

9048 DISEASES OF THE GALLBLADDER AND BILIARY PASSAGES. (Eng.) Small, D. M.; Bennett, P.; Carey, M.; Grundy, S.; Lester, R.; Palmer, R. (Work Group VI, American Gastroenterological Assoc.). *Gastroenterology* 69(5):1121-1130; 1975.

Research needs for diseases of the gallbladder and biliary passages are analyzed. Consideration is given to cholesterol gallstone disease, pigment gallstone disease, cholestasis in adults, diseases of the biliary tract in the newborn and infant, and miscellaneous diseases of the gallbladder and bilia tract. Epidemiologically, cholesterol gallstone disease is the most important, affecting 20-30 million Americans. Epidemiological studies are needed to answer a number of questions regarding etiology. Information is also needed on bile composition, the bile pool size, and synthetic and secretory rates of individual bile acids. New techniques needed include noninvasive methods for the diagnosis of potential gallstone formers, a method for quantitatively investigating gallbladder function in animal and noninvasive techniques for the quantitative determination of gallbladder contraction. This are is currently adequately funded. Epidemiological data on the incidence and prevalence of pigment stones are needed. Research in this area should receive increased support, not only because it affects 3-4 million Americans, but also because it appears that pigment stones may form the nucleus for cholesterol gallstone disease. Epidemiological and biochemical data relating to cholestasis in adults may be accomplished with existing methods, but more advanced studies than are currently in progress are needed. Among the needs in the area of fetal and neonatal biliary disease are tissue and organ culture of the fetal liver, intrauterine surgery, the use of stable isotopes in metabolic studies, noninvasive techniques, and applications of miniaturization developments. Specific information should be collected regarding fetal and neonatal bile salt metabolism, effects of developmenta changes and the intrauterine environment on fetal and postnatal hepatic function, neonatal cholestas and the relationships of neonatal nutrition and the liver. The importance of descriptive and epidemiological studies to define the nature of miscellaneous diseases of the gallbladder and biliary tract and of in-depth research on the quantitative function of the intact cholecystic duct and sphincter of Oddi in both animals and man is stressed.

9049 BIOCHEMICAL COMPOSITION OF THE BILE IN HEALTHY CHILDREN AND THOSE SUFFERING FRO DISEASES OF THE BILE TRACTS. (Rus.) Apostolov, B G.; Ivanov, A. I.; Kravchenko, L. I. (Leningrad In Hygiene and Medicine, Leningrad, USSR). *Vopr. Okh Materin. Det.* 21(5):47-51; 1976.

The biochemical characteristics of B and C biles were studied in 130 patients with chronic cholecys titis and in 17 healthy children. All children we aged 5-15 hr. The quantitative investigations revealed no difference in the bilirubin, choleste phospholipids, bile acids, lipid complex, hexoses, hexosamines, and the gallbladder concentration ind between the patients and the controls. The increa DNA level of the C bile in the patients was appare connected in some of the patients with concomitant duodenitis, duodenal stasis, and regurgitation of the intestinal content to the site of the catheter Involvement of the liver in the pathological proce was not observed. The complex clinical investiga-

ns, fractional duodenal catheterization, cholecys-
raphy, and biochemical investigations revealed
efly functional disturbances in the biliary tract
the patients.

0 INFLUENCE OF CERTAIN CHOLERETICS ON THE VOLUME AND COMPOSITION OF BILE IN HUMANS.

r.) Eulenburg, F.; Bode, J. Ch. (Medizinische
nik, Philipps-Universitat, Marburg, W. Germany).
Gastroenterol. 14(3):354-364; 1976.

effect of four commercial choleretic preparations
bile formation and composition is reported. The
t sample included eight patients, six of whom had
lecystolithiasis or choledocholithiasis with pre-
rative icterus, one with papillary stenosis, and
pancreatic pseudocyst with bile duct constriction.
lies were performed with T-drains in the ductus
ledochus (DC), 4-8 days after ductal revision.
test compounds, Cholagogum Nattermann (CN), Chol-
iz (CA), Chol-Kugelettes (CK), and Chologen 1
), were administered p.o. Fasting secretion was
3-0.93 ml/min; the average cholesterol excretion
420 μg/min, bilirubin was 196 μg/min, bicarbo-
e was 28 mEq/l, and calcium was 1.9 mEq/l. None
the test agents produced an unequivocal increase
bile volume. Bile acid secretion also was un-
ected. Although cholesterol excretion and bili-
in levels showed a wide variation in fasting,
ther of the levels was increased. Bicarbonate
assium, sodium, and calcium were unchanged. In
rast, after secretin the bile volume increased
average of fivefold within 30 min, and no patient
led to show less than a threefold rise. Bicarbo-
e concentration, total excretion, and cation ex-
tion also increased. Bile volume and bile acids
e 2.5-fold, and bilirubin fell to one-tenth the
ting secretion after dehydrocholic acid administra-
n. Taurocholic acid elevated the bile volume
e from 0.27 ml/min to 0.73 ml/min and the bile
d excretion from 2.2 μmol/min to 19.1 μmol/min,
bilirubin depression was slight. The findings
onstrate the inefficiency of the four choleretics
ted, because the changes they caused in choleresis
e within the physiological range.

1 BILE SALTS: THEIR ROLE IN CHOLESTEROL SYNTHESIS, SECRETION AND LITHOGENESIS.

.) Brandt, L. J.; Bernstein, L. H. (Montefiore
., 111 E. 210th St., Bronx, NY 10467). *Am. J.*
roenterol. 65(1):17-30; 1976.

physicochemical properties of bile salts and the
latory effects of bile salts on their own hepatic
thesis and on the hepatic and intestinal synthesis
cholesterol are reviewed. The dissolution of gall-
es using bile salts or phenobarbital is also dis-
sed. Bile salts represent the major products of
hepatic catabolism of cholesterol. Cholesterol
n obligatory precursor of the bile salts in all
ebrates studied. The rate at which the liver
hesizes cholesterol, bile acids, and cholesterol
hydroxylase (which catalyzes the first committed
of bile acid synthesis from cholesterol) appears
e controlled by the bile salt pool in a negative
lback fashion. Present evidence also suggests
that the cholesterol biosynthetic pathway is similar in the liver and the intestine. The evidence in man suggests that hepatic cholesterol synthesis is suppressed by cholesterol feeding, but that intestinal synthesis is not. Thus, during ingestion of a high cholesterol diet, the contribution of the intestine to the circulating endogenous cholesterol pool could equal or exceed that of the liver. Bile salts are conserved primarily by active reabsorption from the ileum, although the stomach, jejunum, and colon are capable of passive absorption; there are three possible mechanisms of bile salt absorption, i.e., active passive micellar, and passive monomeric. Following their absorption, bile acids are transported to the liver in the portal venous blood, bound primarily to albumin. Those bile salts that are not absorbed pass into the colon where they undergo a number of bacterially produced molecular changes resulting in the formation of secondary bile salts. The major physiological function of bile salts is to bring the products of pancreatic lipolysis (fatty acids and monoglycerides) into a micellar solution via their detergent properties. Most studies have indicated that the liver is responsible for the formation of lithogenic bile and that the gallbladder plays no significant role in altering the lipid composition of the hepatic bile. Although it is known that cholesterol will precipitate from bile if the ratio of bile salts and phospholipids to cholesterol falls below a critical level, the exact mechanism is unknown. The feeding of bile acids, particularly chenodeoxycholic acid, has been the most successful method of gallstone dissolution. Some studies have shown that the administration of phenobarbital reduces gallstone size. It can alter bile acid synthesis from cholesterol by altering the activity of cholesterol 7-α-hydroxylase. Future trials will determine whether substituting life-long therapy with bile acids for surgery is a worthwhile goal.

9052 CLINICAL PHARMACOLOGY OF CHOLECYSTOKININ AND PANCREOZYMIN.

(Rus.) Geller, L. I. (Khabarovsk Medical Inst., Khabarovsk, USSR). *Klin. Med. (Mosk.)* 54(3):23-29; 1976.

Results of investigations on the physiological effects of cholecystokininpancreozymin (CP) in normal subjects and in patients with gastroenterological diseases are presented. CP (1.5 U/kg, i.v.) caused a highly significant, but short-term (20 min), increase in the intraduodenal secretion of pancreatic enzymes both in normal subjects and in patients with duodenal ulcer and chronic recurrent pancreatitis. At the same time, an increase in the amylase/lipase coefficient and a decrease in the lipase/trypsin coefficient were observed. The relative reduction of the lipase level was considerably more pronounced in patients with chronic pancreatitis than in normal subjects. CP caused considerable contraction of the gallbladder, the appearance of B bile in the duodenum 3-4 min after administration, and prolonged secretion of C bile, suggesting the relaxing effect of CP on Oddi's sphincter. Investigations of the bilirubin and total lipid levels in C bile demonstrated the choleretic effect of CP. CP had an inhibitory action on gastric hydrochloric acid secretion in normal subjects and in patients with peptic ulcer, and it caused a marked inhibition of the gastroduodenal motor function.

9053 RENAL FUNCTION IN DISEASES OF THE LIVER AND BILIARY TRACTS. (Rus.) Furmanenko, E. D.; Potashnikova, N. P.; Driuk, O. N. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (6):14-16; 1976.

The functional status of the kidney was studied by radioisotope renography (^{131}I-labeled o-iodohippurate sodium) in 22 patients with chronic calculous cholecystitis, 15 patients with chronic noncalculous cholecystitis, and in 17 patients with liver cirrhosis. The changes in the renal function (reduction of blood clearance, delayed isotope accumulation and elimination, and reduced rate of isotope secretion) were smallest in patients with chronic noncalculous cholecystitis, more pronounced in patients with chronic calculous cholecystitis, and most pronounced in patients with liver cirrhosis. The functional changes were usually bilateral. The severity of the changes in the renal function correlated with that of the cholecystopathy and hepatopathy.

9054 A COMPARISON OF THREE CHOLECYSTOGRAPHIC AGENTS: A DOUBLE-BLIND STUDY WITH AND WITHOUT A PRIOR FATTY MEAL. (Eng.) Stanley, R. J.; Melson, G. L.; Cubillo, E.; Hesker, A. E. (Washington Univ. Sch. Medicine, 510 South Kingshighway, St. Louis, MO 63110). *Radiology* 112(2):513-517; 1974.

A double-blind technique was used in 726 patients to test three cholecystographic agents: iocetamic acid, iopanoic acid, and tyropanoate sodium. Standard prone and oblique radiographs plus erect spot films were obtained 10-15 hr after the patients ingested the agent. Graded scoring of radiographs, percentage of diagnostic first-day studies (either normal or diagnostic of abnormality and requiring no repeat study), and the incidence of adverse effects were evaluated. Among 405 patients who received a fat-free meal preceding the ingestion of one of the agents, a 4.5-g dose (6 x 750 mg tablets) of iocetamic acid produced the most dense shadows and highest diagnostic yield (76%), and iopanoic acid (3 g; 6 x 500 mg tablets) yielded the least dense shadows and lowest diagnostic yield (47%). A 3.0-g dose of iocetamic acid produced a 58% yield, and a 3.0-g dose of tyropanoate sodium produced a 71% yield. The difference in density between tyropanoate sodium and iocetamic acid (4.5 g) was not statistically significant. Among the 321 patients who received a fatty meal before ingesting the agent, diagnostic yields of 70, 65, 64, and 68% were obtained with iopanoic acid (3.0 g), iocetamic acid (3.0 g), tyropanoate sodium (3.0 g), and iocetamic acid (4.5 g), resp. The fatty meal also significantly increased the density of the shadows. For the respective agents and dosages, the percentages of patients given a fat-free meal who reported at least one side-effect (nausea and vomiting, diarrhea, headache) were 57, 53, 47, and 56%. Among the patients given a fatty meal, the corresponding percentages were 44, 48, 38, and 44%. Among 95 patients who receive a repeat p.o. dose of contrast medium, the percentages of reported side effects were 54, 44, 31, and 61%, resp. The incidence of diarrhea was greater in the patients given iopanoic acid than in the other agents in both the fatty meal and fat-free meal groups. The results show that significantly better gallbladder visualization was obtained in patients given a fat-free meal and the 4.5-g dose of iocetamic acid. The different effects of the fatty meal upon the various contrast agents suggest a dissimilarity in the properties of these agents relating to absorption and excretion.

9055 VALUE OF RETROGRADE ENDOSCOPIC CHOLANGIOPANCREATOGRAPHY IN CASES OF NEGATIVE OR NON-EVALUABLE CHOLECYSTOCHOLANGIOGRAM. (Ger.) Deyhle, P.; Stuby, K.; Jenny, S.; Nuesch, H. J.; Kobler, E.; Ammann, R.; Sauberli, H. (Departement fur Innere Medizin, Kantonsspital, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 106(9):314-315; 1976.

The indications for endoscopic retrograde cholangiopancreatography (ERCP) are summarized, and experiences with 299 patients in whom i.v. cholecystograp or cholangiography was negative, not evaluable, or not possible are presented. In 45 cholestatic patients, gallstones were identified in 11, extrahepatic duct malformation in 3, papillitis in 3, chronic pancreatitis in 2, pancreatic cyst in 2, tumor adjacent to the liver hilus in 2, and pancreatic carcinoma in 5; 17 patients were negative. The ERCP findings in icterus determine the surgical approach, for which the clarification of extrahepatic and intrahepatic localizations is especially useful. In 37 patients with nonspecific epigastric problems, ERCP found stones in 3, papillitis in 1, ductal malformation in 1, and pancreatic carcinoma in 3; 29 patients were negative. In 55 postcholecystectomy syndromes, stones were identified in 9, papillitis in 7, ductal malformation in 1, pancreatitis in 1, and tumor adjacent to the liver hilus in 2; 35 patients were negative. Only seven instances of complication were established: 5 pancreatites and 2 cholangites, with cyst or tumor cavity filling. ERCP is the method of choice in obstructive jaundice and unclarified cholestasis.

9056 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY (Eng.) Lang, E. K. (Louisiana State Univ Sch. Medicine, Shreveport, LA 71101). *Radiology* 112(2):283-290; 1974.

Percutaneous transhepatic cholangiography was used in the diagnosis of 112 patients with obstructive jaundice. A highly flexible 18-20 gauge polyethylene catheter was advanced 15-18 cm into the liver parenchyma, and bile was aspirated for 10-20 min. Then 10-18 ml of contrast material was infused, and anteroposterior, oblique, and cross-table lateral projections were used to visualize the site of obstruction. This technique is contraindicated in patients with hemorrhagic diathesis,

t responding to medication and in those with
spected *Echinococcus* infection and/or echinococcal
sts. In the present series, percutaneous trans-
patic cholangiography permitted accurate diagnosis
63 of 66 patients (95%) with obstructive jaundice
sulting from calculi in the common duct and those
th carcinoma of the head of the pancreas, papilla
Vater, common duct, or gallbladder. This tech-
que was also reliable for assessing recurrent
oplasms obstructing the choledochojejunostomy
llowing Whipple's procedure. Successful diagnosis
s obtained in only 57% of the patients with
ronic pancreatitis. Puncture was successful in
ly 3 of 10 patients with hepatitis. In patients
th primary or secondary neoplasms of the liver,
rcutaneous transhepatic cholangiography merely
dicated that a space-occupying lesion was present;
teriography or nuclear imaging was required for
definitive diagnosis. In five patients, retention
the Teflon tubing introduced during the puncture
create a temporary or semipermanent biliary
stula was of therapeutic benefit in alleviating
ritus, improving the general condition of the
tient, and permitting earlier surgical interven-
on, or in palliation of terminal disease. A
nplication rate of 10% was recorded; complications
cluded two mild cases of bile peritonitis, five
lerate i.p. hematomas, and one death attributed
gram-negative septicemia.

7 REOPERATIONS FOLLOWING CHOLECYSTOSTOMY.

(Rus.) Nechay, A. I. (Surgical Clinic,
M. Kirov Military Medical Acad., Leningrad, USSR).
rurgiia (10):36-40; 1975.

26 patients subjected to cholecystostomy, 15
h external biliary fistula and 4 with mucous-
prative fistula were admitted to hospital for
peration. At the second operation, malignant tumor
the pancreas was found in two patients and adeno-
cinoma of the major duodenal papilla was found
one. All three patients died. Twelve patients
calculus in the common bile duct and in the gall-
dder, and one had stenosing papillitis. Ten pa-
nts showed no pathological changes in the bilio-
creatic system. Reoperations included removal
the gallbladder in all but one patient. In addi-
n to the cholecystostomy, 15 patients were sub-
ted to choledochotomy. Of the 23 patients who
vived surgery, one, an 82-yr-old woman, died on
2 of acute cardiac insufficiency and the other,
8-yr-old woman, died 32 days postoperatively of
creanecrosis.

8 TREATMENT OF BILIARY ATRESIA. (Eng.)

Bill, A. H. (Children's Orthopedic Hosp.
Medical Center, Seattle, WA). *Adv. Surg.* 8:63-
1974.

pathology and treatment of biliary atresia are
iewed. New information on the pathology of the
er demonstrates that biliary atresia has features
common with neonatal hepatitis. The peripheral
ll drainage ducts may be obstructed early,
ding to cirrhosis; the major intrahepatic ducts may be open to the porta hepatis in the first several months of the disease; and the closure of the extrahepatic ducts may be due to some form of cholangitis. For successful surgical treatment, the diagnosis must be made before 90 days of age and, preferably, before 70 days of age. Diagnosis rests on the presence of relatively acholic stools, a needle biopsy of the liver, and repeated scans showing abnormal retention of ^{131}I-rose bengal dye in the liver. Inspection of the gallbladder and surgical cholangiogram under local anesthesia may also be necessary. The operation devised by Kasai is used in the 90% of patients who have no segment of the extrahepatic duct that can be anastomosed to the intestine. This operation consists of a shallow excision of tissue at the porta hepatis, followed by anastomosis of the small bowel around this area. To prevent the otherwise frequent and often fatal ascending cholangitis, Kasai and his colleagues recommend anastomosis to small intestine with a decompressing external vent. A 40% survival without jaundice for 1 yr or more has been reported when this operation is done before 90 days of age; after 90 days, this survival drops to 7%. These results have improved when surgery was performed before 70 days of age.

9059 STUDIES OF "BLACK BILIARY CALCULI" (EXISTENCE OF MELANIN-LIKE CALCULI). (Eng.)

Nagamitsu, S. (First Dept. Surgery, Faculty Medicine, Kyushu Univ., Fukuoka, Japan). *Gastroenterol. Jpn.* 9(4):359-368; 1974.

Chemical analyses were made of calculi from 24 patients with "black biliary calculi," 22 with cholecystolithiasis, and 2 with choledochocholecystolithiasis. The black biliary calculi are more rapidly discolored by hydrogen peroxide than the brown bilirubin calculi and are assumed to be melanin-like substances. Six of the patients had 1 calculus, 10 had 2 to 100 calculi, and 7 had 100 or more. Macroscopic and histopathological examinations showed that 17 of them had mild or no lesions in the gallbladder, 6 had moderate ones, and 1 had a severe lesion. Lesions in the gallbladder of seven black biliary calculi patients were complicated by strawberry gallbladder, a finding that is rare in bilirubin calculi patients. A metabolic etiology should be considered for the formation of black biliary calculi. Five of these patients showed abnormal findings in liver function tests. Histopathological examinations revealed cirrhosis of the liver in three patients and mild fatty infiltration in two. No pigmentation in the hepatocytes was found. Nineteen of the patients showed positive roentgenograms. Cu, Fe, and Ca are abundant in black biliary calculi, which supports the idea that the black pigment is a melanin-like substance. The calculi may stay in the gallbladder for a long period, bind Ca and other metabolic components to increase their quantity, and eventually give a positive roentgenogram.

9060 POSTOPERATIVE CHOLANGIOLITHIASIS. (Rus.)

Danilov, M. V.; Shishka, K. (A.V. Vishnevskii Inst. Surgery, USSR Acad. Medical Sciences, USSR). *Klin. Khir.* (6):6-10; 1976.

Seventy-six cases of postoperative cholelithiasis occurring after cholecystectomy are presented. Cholangiolithiasis was the only lesion of the bile ducts in 43 cases, and it was due to cholestasis or parasitic invasion, with onset before or after the primary surgery in 33 cases. The incidence of residual calculi at the primary surgery for cholelithiasis can be reduced by careful inspection, cholangiography, and cholangioscopy during cholecystectomy. If multiple calculi are not removed completely and with certainty, wide biliodigestive anastomosis is recommended. Bloodless removal of residual calculi during the postoperative period is possible by means of Dormia's loop under x-ray control. Reoperation for residual or recurrent calculi 1.5 months or more after the first intervention requires internal drainage of the biliary tract.

9061 A STUDY OF TRANSAMINASE ACTIVITY IN LITHIASIC AND CANCEROUS EXTRAHEPATIC BILIARY TRACT OBSTRUCTION.

(Fre.) Tete, R.; Rouchier, D.; Teulieres, J. P.; Vachon, A. (Hotel-Dieu, 1, place de l' Hopital, F 69288 Lyon Cedex 1, France). *Lyon Med.* 233(4):369-379; 1975.

Transaminase (TR) behavior in extrahepatic biliary obstructive pathology was compiled and correlated with disease states. The clinical sample included 82 cases of lithiasis, 75 carcinomas of the head of the pancreas, and 1 bile duct carcinoma. Elevated TR levels were found in 43 of 82 patients with common duct lithiasis; 9 of the 43 had elevated SGPT and SGOT levels (300 Frankel units/ml; normal, 45 FU/ml). The maximum was reached 7 days after the onset of pain and fever and 5 days after icterus. There was no correlation between symptom complex and the number of normal or elevated TR levels. The SGOT/alkaline phosphatase (AP) quotient, corrected for unit conversion, was >10 in six cases, >7 in eight, between 3 and 7 in five, and <3 in none. Among the pancreatic carcinoma patients 47 of 75 had increased TR, with eight SGPT and seven SGOT levels >300. The maximum appeared 19.5 days after icterus. Comparison of symtomatology and TR found normal levels in 21 of 28 with icterus, in 1 of 28 with icterus and fever, and in 6 of 28 with icterus and pain; elevated levels were observed in 41 of 47 with icterus, 2 of 47 with icterus and fever, and 4 of 47 with icterus and pain. The SGOT/AP quotient was >10 in four cases, >7 in eight, between 3 and 7 in nine, and <3 in three. The SGPT/AP was >10 in 5, >7 in 10, between 3 and 7 in 1, and <3 in 4. In the two bile duct carcinomas, the patient with hilar involvement had SGOT, 550; SGPT, 1000; SGOT/AP, 4.6; and SGPT/AP, 6.6. The patient with localization at the ampulla of Vater had SGOT, 140; SGPT, 200; SGOT/AP, 21; and SGPT/AP, 39. In all, 92/159 had elevated SGOT or SGPT; the mean values for SGOT and SGPT, resp., were 170 and 196. There was no difference in TR behavior in lithiasis or cancer, although more moderate increases (100-200 FU) were detected in lithiasis. The relation between stasis and hepatocyte injury is reviewed.

9062 ROLE OF BILE MICROFLORA IN THE ETIOLOGY AND PATHOGENESIS OF CHOLECYSTITIS.

(Rus.) Karavanov, G. G.; Rachkevich, S. L. (Lvov Medical Inst., Lvov, USSR). *Klin. Khir.* (6):10-13; 1976.

Bile samples obtained aseptically during operation or by transcutaneous-transhepatic biopsy from 125 patients with various diseases of the gallbladder and biliary tracts were investigated for infection with microorganisms. Eighty strains of microorganisms were found in 65 patients. Single species wer found in 50 cases and associations of strains in 15. The incidences were 35 of 80 for *Escherichia coli*, 2 of 80 for *Staphylococcus*, 6 of 80 for *Klebsiella*, 7 80 for *Enterococcus*, 2 of 80 for *Candida*, 2 of 80 fo *Salmonella typhosa*, 1 of 80 for *Proteus*, and 3 of 80 for other saprophytes. The incidences of positive bile samples were 15/38 in chronic cholecystitis, 13/18 in aggravated chronic cholecystitis, 26/36 in destructive cholecystitis, 0/10 in bile duct obstruction, 2/11 in cholesterosis, 8/10 in postcholecystectomy syndrome, and 1/2 in other biliary pathologies. The incidence of positive samples was 24/71 in patie without pathological changes of the common bile duct 15/22 in choledocholithiasis, 7/9 in stenosis of the ampula of Vater, 10/12 in pancreatitis, and 9/11 in cholangitis. The findings indicate that while infection is not the prime cause of cholecystitis, it pla an important role in the pathogenesis of this diseas

9063 PAPILLOSPHINCTEROTOMY IN SURGERY FOR COMPLICATED CHOLECYSTITIS.

(Rus.) Knubovets S. Y.; Novikov, F. V.; Zaripov, R. A. (A. V. Vishnevskii Clinic Surgery, Kazan Medical Inst., Kazan, USSR). *Khirurgiia* (10):29-33; 1975.

Experience with papillosphincterotomy in surgery for acute cholecystitis is reviewed. Of 738 patients with complicated cholecystitis treated surgically during 1960-1972, 75 underwent surgery on the major duodenal papilla. After papillosphincterotomy, 57 patients developed jaundice, 40 developed cholangitis, 23 had calculi in the common bile and hepatic ductus, 31 had calculi in the common bile and hepatic ductus and in the duodenum papilla, and 14 had calculi only in the duodenum papilla. Papillosphincterotomy was the treatment of choice when the diameter of the common bile duct was less than 15 mm Two patients underwent papillotomy; 31, partial papillosphincterotomy; 36, subtotal papillosphincterotomy; and 6, total papillosphincterotomy. Five patients underwent additional supraduodenal choledochoduodenostomy. Immediately after surgery, three patients died (one each of double pneumonia, pancreonecrosis, and choledochoduodenostomosis failure). Forty-one patients were followed up for 2-10 yr: 37 were in good condition, and 4 were in satisfactor condition.

9064 DIFFERENTIAL DIAGNOSIS OF DYSKINESIA OF TH BILE TRACTS IN CHILDREN AND TACTICS USED IN THE TREATMENT.

(Rus.) Druzhinina, E. I.; Khodunova, A. M. (Ivanovo Medical Inst., Ivanovo, USSR). *Vopr. Okhr. Materin. Det.* 21(5):51-55; 1976.

The differential diagnosis of dyskinesia of the bili ry tract in 96, mainly school-aged children is described. Dyskinesia was associated with cholangitis in 41 cases. Fractional duodenal catheterization by means of a double-canal catheter with graphic displa of the data and intravenous cholangiography with lculation of the index of the gallbladder motor nction proved to be most valuable for the diagnosis. pertonic dyskinesia was diagnosed in 49 cases, the perkinetic form in 28, and hypotonic dyskinesia 12; the type of dyskinesia could not be established th certainty in 7 cases. There was no correlation tween the type of the pains and the type of dyskin- a. The time elapsing until the appearance of B e after cholagogue administration averaged 27 in hypertonic dyskinesia, 3.5 min in the hyper- etic form, 7 min in the hypotonic form, and 12 in indefinite dyskinesia. The volumes of the e secreted were 18.5, 11.5, 59.4, and 42 ml, resp. e duration of B bile secretion was 37, 13, 26, 19 min. Patients with hypertonic dyskinesia ceived spasmolytics and choleretics. Patients th hypotonic dyskinesia were treated with stimu- ats, magnesium sulfate, and sorbitol.

55 ULTRASONIC STUDY OF VENOUS PATTERNS IN THE RIGHT HYPOCHONDRIUM: AN ANATOMICAL PROACH TO DIFFERENTIAL DIAGNOSIS OF OBSTRUCTIVE UNDICE.

(Eng.) Weill, F.; Eisenscher, A.; Aucant, ; Bourgoin, A.; Gallinet, D. (Service central de diologie, Departement de diagnostic, 2 Place St. cques, 25000-Besancon, France). *J. Clin. Ul- asound* 3(1):23-28; 1975.

e identification of intrahepatic portal veins, stemic veins, and biliary ducts by real-time ultra- nic scans and their use in the differential diag- sis of obstructive jaundice are discussed. The perior mesenteric vein can be identified during first aortic scan or by alternate right and left vements of the ultrasonic head. Its confluence th the vena porta is then sought, and the latter followed from the confluence zone of the hilus. rpendicular transverse scans are then performed examine the hilar portal veins. Transverse abdom- al scans, alternately caudad and cephalad, permit sualization of the splenic vein, after which alter- te left-right movements can be used to follow it. jaundice, the presence or absence of confluence an oblique tubular structure with the superior senteric vein and splenic vein in the right hypo- ondrium is the most reliable means of differentia- g an enlarged common bile duct from the vena porta. terior oblique recurrent retrocostal scans of the ver, with movements of the ultrasonic head parallel the skin surface, display a ductal network in the lum area, and scans of the portal vein usually ow the confluence of this network with the portal in. The confluence of this network with the vena va can also be demonstrated clearly. Demonstra- on of such confluence is necessary to distinguish rtal enlargement caused by portal hypertension, stemic venous enlargement caused by cardiac insuf- ciency, and nonpathological wide veins from obs- uctive jaundice. In the jaundiced patient with enlarged common bile duct, it will be possible demonstrate a confluence between enlarged hilar le ducts and the common bile duct.

56 THE HYPERCHOLESTEROLAEMIA OF OBSTRUCTIVE JAUNDICE.

(Eng.) McIntyre, N.; Harry, D. ; Pearson, A. J. G. (Royal Free Hosp., Pond St., ndon, England). *Gut* 16(5):379-391; 1975.

Recent information concerning the hypercholesterolemia of obstructive jaundice is reviewed. Lipoprotein-X (LP-X), changes in other lipoproteins in obstructive jaundice, the accumulation of cholesterol in plasma, and the clinical importance of high free cholesterol levels are discussed. After the removal of normal low-density lipoprotein from the low-density fraction of patients with obstructive jaundice using antibodies to normal lipoprotein, LP-X remains; this lipoprotein is rich in phospholipid, and 96-100% of the cholesterol is unesterified. Electron microscopy of LP-X has revealed the presence of discs, which are probably flattened vesicles. Cholesterol synthesis in rat liver has been found to be strikingly increased following the ligation of the common bile duct, and this has been accepted as an explanation of the hypercholesterolemia of obstructive jaundice. An altered liver-plasma cholesterol partition also appears to be involved. The mechanism of increased hepatic cholesterol synthesis in obstructive jaundice is not yet clear. A hypothesis concerning biliary lecithin is the most satisfactory explanation available for the hypercholesterolemia of obstructive jaundice. The evidence suggests that lecithin cholesterol acyl transferase, which acts in plasma, is largely responsible for the production of plasma cholesteryl esters. For acyl transfer to occur, free cholesterol and lecithin must enter the plasma, and these compounds should accumulate if lecithin cholesterol acyl transferase activity is reduced; such changes have been found to occur with familial deficiency of lecithin cholesterol acyl transferase and with biliary obstruction. Lecithin cholesterol acyl transferase deficiency may play a part in hypercholesterolemia and may account for lipoprotein changes other than the appearance of LP-X (i.e., changes in high-, low-, and very low-density lipoproteins) in hypercholesterolemia, as some of these changes have been shown to be reversed by the action of the enzyme. Hypercholesterolemia has been produced by the i.v. injection of lecithin in cholecystectomized dogs with common bile duct obstruction. The most striking clinical consequence of hypercholesterolemia is cutaneous xanthomata. Hypercholesterolemia can also cause problems in the interpretation of some laboratory tests, such as lipoprotein electrophoresis for the typing of hyperlipidemia and the measurement of antistreptolysin O titer. Because steroid treatment has been unsuccessful in reducing plasma cholesterol in obstructive jaundice, mechanical methods have been tried. Although plasmaphoresis and plasma exchange are time consuming and inconvenient for the patient, they are effective in reducing plasma cholesterol and in causing the regression of xanthomata.

9067 PATHOGENESIS OF HYPERLIPIDEMIA IN BILIARY OBSTRUCTION.

(Eng.) Osuga, T.; Oda, T. (First Dept. Internal Medicine, Faculty Medicine, Univ. Tokyo, Tokyo, Japan). *Jpn. J. Med.* 14(2): 110-114; 1975.

The pathogenesis of the plasma lipid increment in biliary obstruction was studied with particular reference to the transport and metabolism of cholesterol, lecithin, and bile acids. Diverting bile flow in the squirrel monkey caused rapid changes in the lipid composition. Total and individual bile acids and lecithin concentration in the hepatic bile dropped rapidly. Cholesterol concentration dropped to a lesser extent and even increased in some cases. In several monkeys to whom ^{14}C-cholic and ^{14}C-chenodeoxycholic acid were given i.v. prior to diversion, the specific activity of the individual bile acids in the hepatic bile decreased after ligation, showing that the synthesis of bile acid was renewed in response to interruption of the enterohepatic circulation (EHC). In cases of biliary diversion, the molar percent of cholesterol in the bile increased with time, in contrast to the bile acid. Thus, the renewed synthesis of cholesterol exceeded that of bile acid stimulated by EHC interruption. In dogs in whom the bile ducts were ligated and T tubes inserted to monitor and compare the changes in biliary lipids, the plasma and biliary lipid contents were reversed. In plasma, the cholesterol, lecithin, and bile acids increased 24 hr after ligation, whereas they decreased in the bile. Although regurgitation of bile lecithin into plasma in cases of obstruction was not noted, palmitate was dominant in plasma, bile, and liver after bile duct ligation, and it was dominant in bile prior to ligation. Bile acids and lecithin changed almost concomitantly in plasma and bile in most cases, such as bile diversion or bile duct ligation, implying the close relation between them. In acute biliary obstruction, plasma LCAT activity was elevated with an increment of free and esterified cholesterol in plasma. In the chronic stage with liver cell damages, however, LCAT was reduced and the ratio of esterified to total cholesterol declined.

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9068 GLAND ULTRASTRUCTURE IN HUMAN GALL BLADDER. (Eng.) Laitio, M.; Nevalainen, T. (Dept. Pathological Anatomy, Univ. Turku, Turku, Finland). *J. Anat.* 120(1):105-112; 1975.

9069 ELECTRON MICROSCOPIC OBSERVATIONS ON THE CHOLESTEROL DISTRIBUTED IN THE EPITHELIAL CELLS OF THE GALLBLADDER. (Eng.) Koga, A.; Todo, S.; Nishimura, M. (First Dept. Surgery, Kyushu Univ., Maedashi 3-1-1, 812 Fukuoka, Japan). *Histochemistry* 44(4):303-306; 1975.

9070 ^{75}Se-SELENOMETHIONINE EXCRETION IN BILE AND PANCREATIC JUICE. (Eng.) Pointner, H.; Kinast, H.; Flegel, U. (First Dept. Medicine, Univ. Vienna, Lazarettgasse 14, A-1090, Vienna, Austria). *Digestion* 12(1):61-64; 1975.

9071 EFFECT OF SOMATOSTATIN ON PANCREATIC AND BILIARY FUNCTION [Abstract]. (Eng.) Bloom, S. R.; Joffe, S. N.; Polak, J. M. (Hammersmith Hosp., London, England). *Gut* 16(10):836-837; 1975.

9072 THE BACTERIOLOGY OF THE BILIARY TRACT: A PRELIMINARY REPORT. (Eng.) Sapala, J. A.; Ponka, J. L.; Neblett, T. R. (Henry Ford Hosp., 2799 West Grand Blvd., Detroit, MI 48202). *Henry Ford Hosp. Med. J.* 23(2):81-86; 1975.

9073 TRANSDUODENAL SPHINCTEROTOMY. (Eng.) La Calle, J. J. (Hosp. Santa Cruz, Barcelona, Spain). *Contemp. Surg.* 7(3):51-57; 1975.

9074 INTRAVENOUS CHOLANGIOGRAPHY, IS TECHNIQUE IMPORTANT [Abstract]? (Eng.) Bell, G. D.; Fayadh, M. H.; Frank, J.; Smith, P. L. C.; Kelsey-Fry, I. (St. Bartholomew's Hosp., London, England). *Gut* 16(10):841; 1975.

9075 BEHAVIOR OF CHOLESTEROL AND LIPEMIA AFTE CHOLECYSTECTOMY: CLINIC STUDY. (Ita.) Romeo, S.; Spinella, G.; Sciacchitano, D. (Cattedr di Chirurgia Vascolare, Universita di Catania, Catania, Italy). *Rass. Int. Clin. Ter.* 55(16):959-974; 1975.

9076 POLYPOID LESIONS OF THE ACALCULOUS GALLBLADDER. (Eng.) Tinsley, A. R.; Mulker L. E.; Van der Linde, J. M.; Todd, D. W. (St. Luke' Hosp., Fargo, ND). *South. Med. J.* 68(8):958-962; 1975.

9077 NONVISUALIZATION OF GALLBLADDER DUE TO CANCER OF STOMACH. (Eng.) Ochsner, S. (Ochsner Medical Center, 1514 Jefferson Highway, New Orleans, LA 70121). *J. La. State Med. Soc.* 127(10):391-393; 1975.

9078 BENIGN BILIARY TRACT TUMORS: COMMON BIL DUCT ADENOMA. (Ita.) Valitutti, P.; Amoroso, L.; Maiorano, G. (Ospedali Riuniti "S. Giovanni di Dio e Ruggi D'Aragona," Salerno, Italy *Rass. Int. Clin. Ter.* 55(16):1008-1015; 1975.

9079 SCLEROSING CHOLANGITIS IN PATIENTS WITH ULCERATIVE COLITIS: REPORT OF TWO CASES. (Fre.) Suzanne, J.; Carayon, P.; Gillet, M.; Migu J.-P.; Monange, C.; Boillot, A.; Carbillet, J.-P.; Gisselbrecht, H. (Hopital Saint-Jacques, 1, place Saint-Jacques, F 25030 Besancon Cedex, France). *Arch. Fr. Mal. Appar. Dig.* 64(6):507-520; 1975.

9080 PREVALENCE OF GALL STONES IN DUNDEE: A NECROPSY STUDY. (Eng.) Bateson, M. C.; Boucher, I. A. D. (Univ. Dept. Medicine, Dundes DD 9SY, Scotland). *Br. Med. J.* 4(5994):427-430; 1975.

9081 ELECTROHYDROLYTIC FRAGMENTATION OF RETAI COMMON DUCT STONES. (Eng.) Burhenne, H. J. (Children's Hosp., San Francisco, CA). *Radiolog* 117(3):721-722; 1975.

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85 EXTERNAL BILIARY FISTULA. (Eng.) Ruderman, R. L.; Laird, W.; Reingold, M. M.; sen, I. B. (Dept. Surgery, Univ. Toronto, Toronto, tario, Canada). *Can. Med. Assoc. J.* 113(9):875- 8; 1975.

86 COMPLETE BILIOCOLIC FISTULA. (Eng.) Bergan, A.; Flatmark, A. (Rikshospitalet, iv. Clinic, Oslo, Norway). *Scand. J. Gastroen- rol.* 10(8):839-841; 1975.

87 JAUNDICE AND HEART DISEASE IN AN INFANT GIRL. (Eng.) Watkins, J. B.; Galdabini, J. (Children's Hosp. Medical Center, Boston,). *N. Engl. J. Med.* 293(26):1361-1368; 1975.

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9089 CONTRACTION OF THE CANINE GALLBLADDER IN DIFFERENT DEGREES OF COMMON BILE DUCT OBSTRUCTION. (Eng.) Burgener, F. A.; Fischer, H. W. (Univ. Rochester Medical Center, 260 Crittenden Blvd., Rochester, NY 14642). *Radiology* 116(1): 49-52; 1975.

9090 INTUSSUSCEPTED CYSTIC DUCT CAUSING COMMON DUCT OBSTRUCTION. (Eng.) Aseem, W. M.; Cohn, P. J. (Suburban Community Hosp., Cleveland OH). *Postgrad. Med.* 58(7):125, 126, 128; 1975.

9091 EVALUATION OF THE PATIENT WITH SUSPECTED EXTRAHEPATIC BILIARY OBSTRUCTION. (Eng.) Watson, C. G. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Surg. Clin. North Am.* 55 (2):419-425; 1975.

9092 FATAL HAEMORRHAGE FOLLOWING ATRAUMATIC LIVER RUPTURE SECONDARY TO POST-OPERATIVE PERFORATION OF THE GALL-BLADDER: A CASE REPORT. (Eng.) Eide, J.; Norbye, B.; Hartveit, F. (Haukeland sykehus, Univ. Bergen, 5000 Bergen, Norway). *Acta Chir. Scand.* 141(4):316-318; 1975.

See also, 8440, 8577, 8634, 8635, 8636, 8637, 8638, 8661, 8665, 8666, 8667, 8668, 8669, 8877, 8931, 8934, 8977.

GENERAL

3 MICROCIRCULATORY CHANGES IN THE GASTROINTESTINAL TRACT OF THE HYPOXIC PUPPY: AN CTRON MICROSCOPE STUDY. (Eng.) Harrison, M. W.; nel, R. S.; Campbell, J. R.; Webb, M. C. (Dept. rgery, Univ. Oregon Health Sciences Center, 3181 . Sam Jackson Park Road, Portland, OR 97201). *Pediatr. Surg.* 10(5):599-608; 1975.

gain insight into the development of necrotizing terocolitis of the newborn, the early histologic l ultrastructural changes in the gastrointestinal ct of the hypoxic puppy were studied. Hypoxia s induced in four puppies by increasing the flow N_2 into an endotracheal tube until the O_2 concentration was 7%; the animals were maintained under these conditions for 2 hr before sacrifice. Hypovolemia was induced in four other puppies by withdrawing one-half of the estimated blood volume; the animals were killed 1 hr later. PaO_2 was lower in the hypoxic puppies than in the hypovolemic or control puppies, but the three groups did not differ in terms of heart rate, systolic blood pressure, central venous pressure, pH, or $PaCO_2$. The ileum and, to a lesser extent, the jejunum were cyanotic in the hypoxic animals; the vasculature was prominent, but pulsations were reduced as in the hypovolemic animals. Both groups also demonstrated pale viscera. Light microscopy revealed only minor differences among the control, hypovolemic, and hypoxic puppies. Electron microscopy showed similar changes in the hypoxic and hypovolemic animals, particularly in the ileum and colon. There was an aggregation of platelets and WBC in the vascular space, focal endothelial cell disruption, increased amounts of perivascular edema, and a loss of ultrastructural organization in the mucosal cells. These changes, which were not seen in the controls, appeared to relate to variations in the blood flow to the mucosa of different areas of the bowel and to follow the distribution observed for necrotizing enterocolitis in the human infant.

9094 HISTOLOGIC APPEARANCE OF THE INTESTINAL URINARY CONDUIT. (Eng.) Garner, J. W.; Goldstein, A. M. B.; Cosgrove, M. D. (Los Angeles County—Univ. Southern California Medical Center, Los Angeles, CA). *J. Urol.* 114(6):854-857; 1975.

To identify any adaptive changes that may occur in the intestine when it functions as a conduit of urine, the histology of intestinal urinary conduits (8 ileal and 2 sigmoid) in place for 10 months to 10 yr was studied in 10 patients. The patients were 20-65 yr old. The mucosa of all the ileal conduits displayed chronic inflammatory changes. Mild mucosal edema was found in nine cases, and shortening, flattening, or absence of villi occurred in four patients. The striated border was well preserved, but of patchy distribution in six of the eight ileal conduits. No chronic inflammatory changes of the mucosa of the two sigmoid conduits were found. In both the sigmoid and the ileal conduits, the surface epithelial cells and the lining epithelium of the crypts, including the goblet cells, were well preserved. In all cases, the cells of Paneth were well developed and numerous, even when the conduit was in place for 10 yr. Electron microscopy demonstrated that the Paneth cells were completely normal. It is concluded that the ileum and the large intestine do not undergo adaptive metaplastic transformation when used as a conduit of urine.

9095 HUMAN FAECAL IMMUNOGLOBULINS IN HEALTHY INFANTS AND CHILDREN, AND IN SOME WITH DISEASES AFFECTING THE INTESTINAL TRACT OR THE IMMUNE SYSTEM. (Eng.) Haneberg, B.; Aarskog, D. (Barneklinikken, Haukeland sykehus, N-5016 Bergen, Norway). *Clin. Exp. Immunol.* 22(2):210-222; 1975.

The value of fecal material for studying intestinal immunoglobulins was investigated by comparing the fecal immunoglobulins in 161 healthy infants and children to those in patients with diseases of the intestinal tract or the immune system. The presence of immunoglobulin A (IgA), IgG, and IgM in feces was quantified by single radial immunodiffusion using extracts of freeze-dried feces. IgA in small specimens of feces seemed to mirror the total amount of IgA secreted into the gut at the time of sampling. Presumptive normal values for fecal IgA concentrations in infants and children were established. Agglutinins to rabbit RBC served as markers for the antibody activity. Feces from 17 infants and children just recovered from infectiou enteritis contained significantly higher ($p<0.001$) levels of IgA than feces from controls. IgG was found in feces from nearly one-third of the patien whereas in the controls aged 1 month or older, IgG was measurable in only 4 of 138. The serum levels of IgA and the agglutination titers in the patient group did not differ from the controls. Feces fro three out of five patients with ulcerative colitis in remission contained IgG in markedly increased concentrations. Two patients with IgA deficiency had no detectable IgA in feces, but had increased levels of fecal IgM that agglutinated rabbit RBC. Immunoglobulins were not demonstrated in feces fro three patients with agammaglobulinemia. The findings indicate that feces can be used for the assay of intestinal immunoglobulins.

9096 PROSTAGLANDINS AND CHOLERA: THE OCCURRENCE OF PROSTAGLANDIN-LIKE SMOOTH MUSCL CONTRACTING SUBSTANCES IN CHOLERA DIARRHOEA. (Eng Okpako, D. T. (Dept. Pharmacology, Univ. Ibadan, Ibadan, Nigeria). *Prostaglandins* 10(5):769-777; 1975.

Prostaglandin-like substances (PLS) that contracte smooth muscle were identified in the acid lipid extracts of diarrheal feces from 10 of 11 patients presenting clinical symptoms of cholera. Five of these cases were subsequently confirmed bacteriologically, while no *Vibrio cholerae* were isolated from the cultures of the other six. The PLS activity in individual samples ranged from 3 to 27 ng of prostaglandin E_2 (PGE_2) equivalents per ml of stool. Parallel bioassay (with either the rat stomach strip or the rat stomach and rat colon) an thin layer chromatography indicated that approximately 60% of the activity was due to PGF, 15% to PGE, and the rest to unidentified lipid substance(It is suggested that increased prostaglandin production may at least contribute to cholera.

9097 INFANTILE PAPULAR ACRODERMATITIS: A REVIEW OF THREE CASES. (Fre.) Laurent, Caperan, D.; Esgavoyer, J.-M.; Agache, P.; Raffi, (Clinique Pediatrique, C.H.U., 25000 Besancon, France). *Rev. Pediatr. (Paris)* 11(6):315-319; 197

Three case histories of pediatric papular acroderma titis (PA) are described. Each child presented wi a characteristic picture of reddish, often purpura lenticular papules, especially on the cheeks and limbs. Pruritis was rare, but the eruption was regularly associated with micropolyadenopathy and discrete hepatomegaly; splenomegaly was less frequent, and fever and rhinopharyngitis were transient. The onset of PA is routinely sudden, withi 24-48 hr, and it remains unchanged for 20-40 days before diminishing after a brief desquamation phas The hematology is nonspecific: lymphocytosis is constant and it can persist for 4 months, but the monocytosis is transient. Ganglion histopathology shows a diffuse reticulohistiocytic hyperplasia. In the three children, the transaminases were norm at onset of eruption and increased slightly and

:ansiently, especially SGOT; serum LDH and aldolase
ere also elevated. The presence of the Australia
ıtigen in all three cases suggests that there may
: an etiologic relation to serum hepatitis.

)98 TRANSCATHETER HEMOSTASIS OF GASTROINTESTINAL BLEEDING USING MODIFIED AUTOGENOUS
.OT. (Eng.) Bookstein, J. J.; Chlosta, E. M.;
oley, D.; Walter, J. F. (Univ. Hosp., 225 Dicken-
on St., San Diego, CA 92103). *Radiology* 113(2):
77-285; 1974.

:eliminary experiments were carried out in six
ogs and nine humans to evaluate the use of modified
ıtogenous clot as an agent for transcatheter hemos-
ısis. The renal arteries of the dogs were cathe-
erized. Sixteen embolic aliquots were injected
ıto the dogs' kidneys, using modified and unmodified
.ots, i.e., an unmodified clot formed from 5 ml of
.ood allowed to set for 15-60 min, a clot consisting
: 0.24 or 12.5% amino caproic acid, a clot formed
ı a matrix of oxidized cellulose, and a clot con-
ıining both amino caproic acid and oxidized cellu-
ose. Appropriate aliquots of clot, usually 0.1 ml
: oxidized cellulose clot or 0.5-1 ml for other
.ots, were injected. Arteriograms were obtained
:ior to, approximately 2 min after, and usually
5 min and 24 hr after embolization. Unmodified
.ot fragmented and lysed extremely rapidly and left
) significant infarction in the four injected
.dneys. The 0.24% amino caproic acid containing
.ot behaved as an unmodified clot in three injected
.dneys. The 12.5% amino caproic acid clot (1 ml)
ostructed larger arteries than the unmodified clot,
ıd produced a few small infarcts in the two injected
dneys. An oxidized cellulose clot of 0.1 ml
oduced obstruction of larger arteries in the four
dneys injected than 1 ml of amino caproic acid
ot, and extensive infarcts were produced. The
havior of a single clot formed from both oxidized
llulose and amino caproic acid in a single dog
s similar to that of a clot formed from oxidized
llulose alone. Gastrointestinal bleeding was
eated by transcatheter clot embolization in nine
tients, six of whom had been previously treated
th vasopressin but did not respond. Depending
on the clinical and coagulation conditions, the
llowing agents were added: 300 NIH U thrombin;
ino caproic acid consisting of 0.5% of the clot;
osened oxidized cellulose; and 1 ml of platelets.
e total volume of clot was 1.0-2 ml. Bleeding
s immediately controlled in all patients, and
ntrol was permanent in seven. Among the five
rviving patients, there were two instances of
ansient duodenal infarction. Transcatheter
bolization should be used in cases in which vaso-
essin has failed to control gastrointestinal
morrhage. Care must be taken to use the smallest
ssible amount of clot and to position the catheter
p as close to the bleeding site as possible.

99 SHIGELLOSIS SIMULATING SERIOUS HEMORRHAGIC RECTOCOLITIS. RADIOLOGICALLY MANIFEST
LIC ULCERATIONS; DIAGNOSTIC PROBLEMS. (Fre.) Weissman, A.; Preel, J.-L.; Blanc, D.; Boussougant, Y.; Hardouin, J.-P. (Hopital Louis-Mourier, F 927000 Colombes, France). *Ann. Med. Interne (Paris)* 127(3):269-273; 1976.

Problems in the differential diagnosis of shigellosis are examined in a case report. A 63-yr-old woman with no gastrointestinal history presented with massive diarrhea, nausea, vomiting, and fever after a visit to the tropics. Treatment with diphenoxylate was ineffective. The patient became increasingly dehydrated, with marked leukocytosis and 78% neutrophilia. Coproculture was negative. Colistine, paromomycin, and metronidazole were without result. Rectoscopy showed a hemorrhagic and purulent mucosa, and biopsy revealed a nonspecific picture of necrosis, ulceration, and an excess of neutrophils, lymphocytes, and plasmocytes. The diagnosis was hemorrhagic rectocolitis after colon intolerance of barium lavage. The signs and symptoms were subsequently rapidly exacerbated, with paraclinical confirmation of acute exudative colopathy: calcium, 78 mg/l; magnesium, 13 mg/l; albumin, 22 g/l; protein, 44 g/l; lipid, 4.3 g/l; and cholesterol, 0.9 g/l. A fecal culture disclosed the presence of *Shigella dysenteriae*. The serum was then found positive (1 of 100) for *S. dysenteriae* and *S. flexneri* I, but not *S. sonnei*. Cure was rapid with ampicillin (6 g/l, i.v.) and colistine (3 x 10^6 U/daily, p.o.), and there was complete clinical and paraclinical normalization in 2 months.

9100 A DIAGNOSTIC STUDY OF PATIENTS WITH UPPER ABDOMINAL PAIN. (Eng.) Mollman, K.-M.; Bonnevie, O.; Gudbrand-Hoyer, E.; Wulff, H. R. (Gentofte Univ. Hosp., DK-2900, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 10(8):805-809; 1975.

9101 THE PLASTIC LIGHTGUIDE IN ENDOSCOPIC LASER PHOTOCOAGULATION. (Eng.) Reidenbach, H.-D.; Bodem, F.; Fruhmorgen, P.; Brand, H.; Demling, H. B. (Medical Dept., Univ. Erlangen-Nuremberg, Germany). *Endoscopy* 7(4):196-201; 1975.

9102 HUMAN INTESTINAL SPECIFICITY TOWARD DIETARY STEROLS STUDIED BY BALANCE METHODS. (Eng.) Ravi Subbiah, M. T.; Kottke, B. A.; Carlo, I. A.; Naylor, M. C. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Nutr. Metabol.* 18:23-30; 1975.

9103 RELATIONSHIP OF INDUCED ANTIBODY TITRES TO RESISTANCE TO EXPERIMENTAL HUMAN INFECTION. (Eng.) Hornick, R. B.; Cash, R. A.; Libonati, J. P. (Univ. Maryland Sch. Medicine, Div. Infectious Diseases, MD). *Prog. Drug Res.* 19:542-545; 1975.

9104 2-(3,4-DICHLOROANILINO)QUINOLIZINIUM BROMIDE, A UNIQUE ANTISPASMODIC, ANTISECRETORY, AND ANTIULCEROGENIC AGENT. (Eng.) Alaimo, R. J.; Goldenberg, M. M. (Pharmacometrics Div., Norwich Pharmacal Co., Norwich, NY 13815). *J. Med. Chem.* 18(11):1145-1147; 1975.

9105 DIETARY FIBER [Abstract]. (Eng.) Kritchevsky, D. (Wistar Inst., Philadelphia, PA 19104). *Cereal Foods World* 20(9):447; 1975.

9106 DIETARY FIBER IN HUMAN NUTRITION. (Eng.) Spiller, G. A.; Amen, R. J. (Syntex Res., Palo Alto, CA). *Crit. Rev. Food Sci. Nutr.* 7(1): 39-70; 1975.

9107 CALCIUM, PHOSPHORUS AND NITROGEN RETENTION IN LONG-TERM PARENTERAL NUTRITION IN INFANTS [Abstract]. (Eng.) Ricour, C.; Balsan, S. (No affiliation given). *Acta Paediatr. Scand.* 63 (Suppl. 4):659; 1974.

9108 INTRAVENOUS FEEDING IN PAEDIATRIC SURGERY [Abstract]. (Eng.) Borresen, H. C. (No affiliation given). *Acta Paediatr. Scand.* 63(Suppl. 4):659; 1974.

9109 DUODENAL MICROFLORA. A PROSPECTIVE STUDY IN PEDIATRIC GASTROINTESTINAL DISORDERS. (Eng.) Lloyd-Still, J. D.; Shwachman, H. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033). *Am. J. Dig. Dis.* 20(8):708-715; 1975.

9110 DISEASES OF THE GASTROINTESTINAL SYSTEM. (Eng.) Hodkinson, H. M. *In: An Outline of Geriatrics*. (London: Academic Press): pp. 108-114; 1975.

9111 A DIFFERENT APPROACH TO THE MANAGEMENT OF SUBMANDIBULAR GLAND DISEASE. (Eng.) Kirschner, E. A. (Massachusetts Eye Ear Infirmary, Boston, MA). *Trans. Am. Acad. Opthalmol. Otolaryngol.* 80(5):474-485; 1975.

9112 ALLERGY IN THE GASTROINTESTINAL TRACT. (Eng.) Anonymous (No affiliation given). *Lancet* 2(7943):1021-1023; 1975.

9113 CONGENITAL DEFECTS OF THE GASTROINTESTINAL TRACT AND ABDOMINAL WALL: A THREE-YEAR REVIEW. (Eng.) Raffensperger, J. G. (Children's Memorial Hosp., 2300 Children's Plaza, Chicago, IL 60614). *Am. J. Dis. Child.* 129(10):1145-1150; 1975.

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Parasitology

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See also, 8629, 8712, 8967.

Regional Enteritis

9174 THE PLACE OF ILEORECTAL ANASTOMOSIS IN CROHN'S DISEASE. (Eng.) Steinberg, D. M.; Allan, R. N.; Cooke, W. T.; Alexander-Williams, J. (4 Ventnor Ave., West Perth, Western Australia 6005). *Aust. N.Z. J. Surg.* 46(1):49-54; 1976.

A long-term follow-up study was performed on 41 patients having undergone an ileorectal anastomosis after colectomy for Crohn's disease. One patient died, an operative mortality of 2.5%, and nine of the patients had evidence of an anastomosis leak. Six had a defunctioning ileostomy at the time of the surgery. Seven have since died, a late mortality of 17.5%; three deaths were a direct consequence of recurrent disease. Profuse diarrhea, uncontrolable by steroids or antidiarrheal agents, was the major factor leading to a decision to substitute an ileorectal anastomosis for an ileostomy. Proven recurrent disease was found in 20 of the 36 patients having a follow-up period of at least 7 yr. In all 20, the recurrence was adjacent to the anastomosis. The current health status, biochemical and hematological parameters, and the number of reoperations in the surviving patients compare favorably with the outcome of 64 patients surviving ileostomy. Patients who maintained their ileorectal anastomosis had relatively few readmissions to the hospital. A higher incidence of biochemical abnormalities in the ileorectal group suggests continued disease activity in the distal ileum or rectum despite apparent good health. After panproctocolectomy for Crohn's disease, a high incidence of delayed peritoneal healing and occasional dyspareunia, due to scarring in the perineum, favor ileorectal anastomosis. In addition, sexual problems on the order of 5-10% may arise in men after proctectomy. It is concluded that ileorectal anastomosis is useful for the treatment of diffuse colonic disease, particularly if the ileum is uninvolved.

9175 RESULTS OF TREATMENT OF CROHN'S DISEASE WITH BCG. (Fre.) Dupuy, R.; Bernades, P.; Vallin, J.; Desouches, G.; Boulard, Ch. (Hopital Beaujon, 100, bd General Leclerc, 92110 Clichy, France). *Sem. Hop. (Paris)* 50(52/53):3147-3155; 1974.

The *Bacillus Calmette-Guerin* treatment of Crohn's disease in eight patients is reported. The attenuated BCG had been exposed to heat for 1 hr at 90 C. A 30-yr-old man with progressive disease since age 12, which was refractory to corticotherapy, showed a regression of pain and diarrhea and radiological improvement within 1 yr after BCG administration. A 21-yr-old woman received BCG in weekly doses for 6 months, followed by bimonthly doses for another 6 months. There was a rapid disappearance of the clinical signs, but a radiological cure was delayed for 2 yr. Several months of BCG therapy in a 35-yr-old man with a 10-yr history of occlusive disease had no effect. BCG treatment for 1 yr in a 30-yr-old man with relatively recent ileocecal progressi
led to a rapid clinical and radiological remission
the patient refused subsequent therapy after a
sudden symptomatic renewal. A clinical and radiological cure was achieved in a 55-yr-old woman aft
7 months of treatment. A 53-yr-old woman with a
progressive history of malabsorption, anemia, electrolytic disorder, and intestinal bleeding receive
BCG for 1 yr, with clinical and radiological impro
ment for 5 months. She succumbed to a fatal septi-
cemia after 5 months. BCG administration in a 29-yr-old man, in whom an ileotransversostomy and
prednisolone had elicited only transient relief, l
to satisfactory clinical amelioration after 10 mon
of therapy without radiological improvement. BCG
management for nearly 1 yr in a 43-yr-old man with
a history of jejunal resection was associated with
the onset of signs of acute appendicitis. BCG
appears to be ineffective in frank occlusive disea
and it may lead to intestinal obstruction, which
may require surgery.

9176 CROHN'S DISEASE IN CHILDREN. REPORT OF 11 CASES. (Fre.) Paris, J.; Blanckaert
D.; Paris, J.-C.; Morel, P.; Delattre, P.; Farriau
J.-P.; Fontaine, G. (Clinique pediatrique, Cite
Hospitaliere, 59000 Lille, France). *Ann. Pediatr.*
(Paris) 23(4):309-323; 1976.

The case histories of 11 children (7 boys and 4
girls) with Crohn's disease are summarized. Among
the prodromal signs or symptoms, weight loss and
diarrhea were most frequent, followed by hyperther
mia, diagnosis after appendectomy, abdominal pain,
hypochromic anemia, and anal lesions. Delayed
puberty, menstrual irregularity, erythema, and hyp
plastic tooth enamel were contingent signs. Infla
matory syndromes were marked by an accelerated
sedimentation rate, increased α-2- and γ-globulin,
elevated fibrinemia, positive C-reactive protein,
and leukocytosis. Radiological localization included the ileum and right colon (3 cases), the
ileum and Bauhin valve (2), the terminal ileum onl
(3), and the entire colon (3). Radiological signs
were hypertrophied Peyer's patches (follicular jej
itis), the string sign, stenosis and dilation
(ileal stasis), and the classical modifications of
distal, intermediate, and proximal segments on the
same loop. Fistulization was frequent, including
intramural fistulas. Colon involvement occurred i
8 of 11 patients, preferentially on the right (6 o
11). Favorable prognoses were established in 6 of
11 patients after the following treatment modaliti
right hemicolectomy and ileal resection, right hem
colectomy extended to the transverse colon, cortic
and immunosuppressant therapy, corticoids and anti
bacterial agents followed by total colectomy, and
antibacterial agents plus secondary colectomy. Th
results of *Bacillus Calmette-Guerin* therapy remain
equivocal. Intestinal resection is still the meth
of choice.

7 REGIONAL ENTERITIS (CROHN'S DISEASE) IN
CHILDREN AND YOUNG ADULTS. (Ger.) Brun-
, H.; Dill, J.; Hauke, H. (Olgahospital, Bis-
kstr. 8, D-7000 Stuttgart 1, W. Germany).
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nostic and therapeutic experiences with pediat-
regional enteritis (Crohn's disease, CD) are re-
ed. The clinical sample included nine boys and
girls, 6 weeks-15 yr of age. Two patients
ented with acute benign ileitis, and 12 with
Clinical and radiological confirmation of CD
established in one case, but the histology
clearly ulcerative colitis; a subtotal ileo-
ctomy was required. In all cases, the extra-
stinal symptoms included fever, weight loss,
growth arrest, while the intestinal symptoms
predominantly anorexia, abdominal pain, diar-
, nausea, and vomiting. Radiologically, the
inal ileum was involved in six cases, the colon
ne, the jejunum and terminal ileum in one, and
terminal ileum and colon in seven. Involvement
he rectosigmoid mucosa, including injection,
a, inflammation, and ulceration, occurred in
cases. All patients had elevated sedimenta-
rates and left shift. Most were anemic, and
t had a leukocytosis. Salicylazosulfapyridine
g/day) was administered to all patients.
lemental prednisone (2 mg/kg/day) and azathio-
e (4-5 mg/kg/day) were given to seven and two
ents, resp. Clinical healing was obtained
our and radiological cure in three cases; the
inder showed mixed improvement and exacerbation.
e patients were radiologically and clinically
d; two of them had acute ileitis, and only one
authentic CD.

ULCERATIVE COLITIS AND CROHN'S DISEASE OF
THE COLON—A COMPARISON OF THE LONG TERM
OPERATIVE COURSES. (Eng.) Fawaz, K. A.; Glotzer,
.; Goldman, H.; Dickersin, G. R.; Gross, W.;
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hundred seventy-six patients with colitis and
colitis of unknown etiology from two previously
rted series were combined, and the follow-up
ies were extended to compare the long term post-
ative courses of ulcerative colitis (UC) and
n's disease of the colon (CDC). The combined
es provided a mean postoperative follow-up period
UC of 14 yr (5-31) and for CDC of 13.1 yr (5-36).
e were highly significant associations between
rally accepted clinical and distributional fea-
s of UC and CDC and microscopic findings general-
egarded as reliable for each. However, because
ectrum of features was found in each entity,
her clinical and distributional nor microscopic
ures alone are sufficient for diagnosis in every
. There were no differences in gross or disease-
ted mortality in UC and CDC whatever the method
iagnosis. After anastomotic procedures in CDC,
currence rate of 73% was found. After proctoco-
omy, the ileostomy revision rate (considering
types or those which required further excision
leum) was higher in CDC than UC, whether the
diagnoses were based on microscopic, clinical, or combined criteria, but the differences reached statistical significance only in the comparison of clinical UC (revision rate, 21%) with clinical CDC (revision rate, 40%). Moreover, after the first two postoperative years, the risk of having an ileostomy revision in UC and CDC (combined criteria) per patient year follow-up was identical, and there were no cases of short bowel syndrome. Differences in the clinical courses of UC and CDC after colectomy and ileostomy are of degree and do not reflect the ultimate course or potential for rehabilitation. Decisions regarding surgical therapy should be made independent of the diagnosis of UC or CDC.

9179 IN VITRO STUDIES OF INFLAMMATORY BOWEL DISEASE: SURFACE RECEPTORS OF THE MONONUCLEAR CELL REQUIRED TO LYSE ALLOGENEIC COLONIC EPITHELIAL CELLS. (Eng.) Stobo, J. D.; Tomasi, T. B.; Huizenga, K. A.; Spencer, R. J.; Shorter, R. G. (Mayo Medical Sch. and Foundation, Rochester, MN). *Gastroenterology* 70(2):171-176; 1976.

The ability of peripheral blood mononuclear cells from patients with either Crohn's disease or ulcerative colitis to lyse isologous or allogeneic colonic epithelial cells was studied. Using the ability of thymus-derived (T) lymphocytes to bind sheep RBC to their surface and the property of bone marrow-derived (B) lymphocytes to display easily detectable surface immunoglobulin determinants, the cytotoxicity of these lymphocyte subpopulations was tested. Rosette-forming cells were separated from nonrosette-forming cells by sedimentation over ficoll-hypaque. Cell fractions at the top (interface) and bottom (pellet) of the ficoll-hypaque, as well as control cells that were separated and recombined, were treated with Tris-buffered NH_4Cl to lyse the sheep RBC. Mononuclear cells at the bottom of the gradient, although enriched in the relative frequency of T cells, were able to lyse only 1% of the colonic epithelial cells. Cells at the top of the gradient demonstrated a fivefold decrease in the relative frequency of cells capable of forming rosettes with sheep RBC and a twofold increase in the ability of these cells to lyse the target epithelial cells. Lysis of the sheep RBC in each fraction did not affect the subsequent ability of cells to either reform sheep RBC rosettes or to bind Fl-anti-human immunoglobulin G to their surface. Thus, the relative frequency of T and B cells in the control population was similar to that noted for lymphocytes not treated with Tris-Buffered NH_4Cl (T=71%, B=20%). Inhibitory influences for cytotoxicity existing within the T-enriched populations were not demonstrated. It thus appears that the cytotoxic mononuclear cells from the patients with inflammatory bowel disease is not contained within the majority of T cells. Cell fractions demonstrating a threefold increase in their relative frequency of immunoglobulin-bearing B cells had a low cytotoxicity (9%) in comparison with cell fractions low in B cells (31.6% cytotoxicity) and with control cells (23.3%). Cytotoxicity was enriched among cell populations adhering to plastic petri dishes coated with aggregated immunoglobulin G, but not to dishes coated with immunoglobulin lacking the

Fc piece. This implies that the effector cell bears a surface Fc receptor. Therefore, as regards surface receptors present on the effector cell, the *in vitro* lysis of colonic epithelial cells appears to resemble most closely antibody-dependent, cell-mediated cytotoxicity.

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9183 AN EPIDEMIOLOGICAL SURVEY OF CROHN'S DISEASE IN NORTHERN IRELAND. (Eng.) Humphreys, W. G. (Queen's Univ., Belfast, BT12 6BJ, N. Ireland). *Proc. R. Soc. Med.* 68(9):572-574; 1975.

9184 INFLAMMATORY DISEASE OF THE LARGE BOWEL IN CHILDREN [Abstract]. (Eng.) Cairns, D.; Nixon, H. H. (Hosp. Sick Children, Great Ormond St., London, WC1, England). *Gut* 17(5):391; 1976.

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See also, 8652, 8841, 8843, 8845.

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